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ANTON C. ZVOLANEK

A WELL KNOWN ORIGINATOR OF WINTER FLOWERING SWEET PEAS, WHO
HAS DONE MORE THAN ANYONE ELSE TO IMPROVE AND
EMPHASIZE THEIR VALUE

SWEET PEAS FOR PROFIT

CULTIVATION—UNDER GLASS
AND OUTDOORS

A PRACTICAL GUIDE TO MODERN METHODS
OF GROWING THE SWEET PEA
FOR MARKET PURPOSES

ILLUSTRATED

BY
J. HARRISON DICK
(EDITOR OF THE FLORISTS' EXCHANGE)

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DEDICATION

TO AN UNKNOWN WOMAN

TO THE PERSEVERING WORKING WOMAN WHO, BY 25 YEARS' PATIENT AND PERSISTENT SELECTION AND LOVING REGARD, WAS THE MEANS OF EXTRACTING FOR THE USE OF SUCCEEDING FLORISTS, THE EARLY FLOWERING AND BRIGHT AND BEAUTIFUL SWEET PEA, KNOWN AS BLANCHE FERRY. HER NAME IS NOT KNOWN : WHETHER SHE YET LIVES IS UNKNOWN : BUT SHE WAS THE INSTRUMENT QUITE AS TRULY AS OTHERS WHO HAVE FOLLOWED HER, WHOSE NAMES ARE EMBLAZONED ON THE HORTICULTURAL SCROLL OF FAME, HAVE BEEN INSTRUMENTAL IN PERFECTING THE PRESENT DAY RACE OF EARLY FLOWERING OR WINTER SWEET PEAS BY PROVIDING TO THE HANDS OF THE HYBRIDIZERS OF MORE RECENT YEARS THE GREAT AMERICAN VARIETY ALREADY MENTIONED, AND MADE IT POSSIBLE TO EXPRESS FROM IT THE WONDERFUL FLOWERS WHOSE COLORS AND FRAGRANCE AND ELEGANCE DELIGHT US AT CHRISTMAS, AND PLEASE US WHEN THE LAKES ARE FROZEN AND THE SNOWS LIE DEEP

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CONTENTS

(FOR CLASSIFIED INDEX SEE PAGES 143-147)

	Page
Chapter I—Market Conditions	12
Chapter II—Cost and Profits.....	24
Chapter III—Houses.....	36
Chapter IV—Cultivation.....	47
Chapter V—Sectional Treatises.....	78
Chapter VI—Varieties.....	95
Chapter VII—Cutting, Packing and Marketing.....	99
Chapter VIII—Raising New Varieties.....	105
Chapter IX—Outdoor Cultivation (with a section on “Up-to-date culture in England”).....	109
Chapter X—Pests and Diseases.....	121
Chapter XI—History of Winter-flowering Sweet Peas.....	128

ILLUSTRATIONS

Anthracnose disease of Sweet Peas.....	123
Arkwright, Rev. Edwyn, and his Télemly Sweet Peas	135
Beal, Prof. A. C.....	18
Branching of Summer and Winter-flowering types of Sweet Peas	73
Burpee, W. Atlee.....	141
Canada, house of Sweet Peas in.....	43
Diseases of Sweet Peas:	
Anthracnose	123
Mosaic	125
Sclerotinia	122
Eckford, Henry, the late.....	141
Exhibits of Sweet Peas at flower shows.....	13, 22
Grandiflora and Spencer types	88

	Page
Houses for Sweet Peas:	
Cross section view	38
Exterior view	37
Interior view.....	25, 33, 35, 39, 41, 43
Mosaic disease of Sweet Peas.....	125
Packing for market.....	101, 103
Sclerotinia disease of Sweet Peas.....	122
Single stem system of cultivation.....	42, 69, 71
Spencer and Grandiflora types.....	88
Summer flowering type of Sweet Pea, branching of.....	73
Supports for Sweet Peas.....	62, 63, 65
Sweet Peas in the open air.....	65, 114, 135
Sweet Peas packed for market.....	101, 103
Sweet Peas, single stemmed system of cultivation.....	42, 69, 71
Sweet Peas under glass.....	25, 33, 35, 39, 41, 43
Sweet Peas, varieties of:	
Christmas Pink under glass.....	35
Christmas Pink, vase of.....	93
Frilled Pink, spray of.....	15
Frilled Pink, under glass.....	25
Gladys Unwin.....	137
Inspector, vase of.....	30
King White, row in open air.....	65
King White, vase of.....	85
Maggie Stark, Double.....	91
Margaret Atlee.....	117
Mrs. Alexander Wallace, house of.....	79
Mrs. Wm. Sim, vase of.....	56
Rose Queen showing floriferous character.....	33
Rose Queen, vase of.....	83
Telemly:	
Row of.....	135
Spray of.....	132
Yarrawa, spray of.....	51
Vase of Winter-flowering Sweet Peas, decorative.....	19
Winter-flowering type of Sweet Pea, branching of.....	73
Zvolanek, Anton C.....	2

INTRODUCTION

Winter Sweet Peas, grown under glass, have come into much prominence in the last few years particularly, and good prices have on the whole been paid for them. To a large extent they have been displacing the Violet; and to a lesser degree, but still appreciable, the beautiful Lily of the Valley. It is also more than likely that a still greater number of Peas will be upon the wholesale markets in the times ahead. This is made evident by the numerous inquiries that have been appearing in the various trade papers; but growers would be wise to proceed cautiously and not overload the market with these Winter flowers. If everybody rushes into the Sweet Pea growing business, and if the markets are burdened, it follows, as night the day, that prices which heretofore have been sufficiently enticing will fall to zero level, and no one will benefit, possibly not even the public.

Yet there is room for very many more Peas, and need for further information in regard to the returns obtainable and how to cultivate and market them, for there are many smaller growers who would be very glad to be able to add Sweet Peas to their Winter cut flower supply if they knew better how to handle the crop and appraise its value to them. It is in order to help them, and to satisfy the eager demand for knowledge of the Winter Sweet Pea crop particularly, that this little book is published.

Extracts from the weekly price lists, issued at various centers, demonstrate that the average returns at Chicago between September and February, inclusive, are \$1 to \$1.50 per hundred sprays, and from March to June, inclusive, 50c. to 75c. The general average for the

year is, therefore, 75c. to \$1.10. The best Spencer Sweet Peas fetch the higher rates until the month of May.

In New York the cheaper grades have sold at from 15c. to 60c. per dozen bunches of 12 sprays each from January to July, and 85c. to \$1.60 for the best flowers during February to the middle of May.

In Boston the average from December to June is 40c. to \$1.25; and in Philadelphia, from the beginning of December to the end of March, inclusive, the average wholesale returns are 50c. to \$1.20 per hundred sprays.

A serious attempt has been made in the chapter on cultivation to impress the need of thoroughness and the best care in the whole treatment of the Sweet Pea crop. Now that selections are being made by the larger growers, and when seeds of novelties are being sold at the rate of 25 seeds for \$1.50, or 6c. apiece, and when even 25c. per seed has been declined by some raisers of new seedlings, it behooves the grower to look upon the Winter Sweet Pea with the utmost respect. The time has come when its cultivation is viewed from a more scientific basis altogether. It must rise to a higher place in the estimation of growers in general, for it will be found, we imagine, that the best Spencer Peas require as much watchfulness and skill to produce, as good class Roses and Carnations. The man who gets that fact stamped upon his mind is the man who is likely to succeed the best.

The Sweet Pea has not yet by any means reached the climax of its perfection. Better varieties are sure to arise year by year. By and by we shall expect to see larger, better frilled, and even more beautiful color combinations, and to have the flowers more closely arranged on the spike.

A speaker at the conference of the American Sweet Pea Society in New York in June, 1914, asked the question:

What has the future in store? and prophesied in these words: "To my mind it will bring forth things which have never been dreamed of. Already we have had a glimpse of what is coming by the new true double flowers. These are quite different from the duplex type. They are most wonderful flowers, and will rival the most expensive orchid, perhaps not only in beauty but in price, as the seeding qualities are very light. Then in the early flowering section I look for good, fixed Spencer flowers in colors suitable for florists, and with the desirable qualities of the early flowering varieties of the past. There is yet much room for improvement in this section and an idea of what is to come can be had from the Australian variety Yarrawa Spencer."

A year or two ago, in delivering his presidential address to the American Sweet Pea Society, William Sim, Clifftondale, Massachusetts, observed that "a better exhibition of Sweet Peas could be made in March and April than in July. The Sweet Pea industry has been created in which many hundreds, or it may be thousands, of people are engaged, and calling for a very considerable expenditure of money." He further expressed the opinion that when the early flowering or Winter type is fully developed it will be the leading one, both for outdoor and under glass. He was speaking strictly, of course, of conditions in the Eastern United States; his opinions, however, have not gone uncontested.

The Sweet Pea is delightful in every sense of the word. It is graceful, beautiful and fragrant (and one sincerely hopes that raisers of new kinds will not perpetuate scentless varieties), and it is obtainable in a wide range of lovely colors, so that it is destined to remain one of the most popular of all our flowers.

CHAPTER I

MARKET CONDITIONS AND AVERAGE PRICES

The man who has to make his living from the growing and selling of crops is first of all obliged to consider the probable cost of, and returns from, a given crop. The cost of growing Winter-flowering Sweet Peas is certainly not greater than the cost of growing the same area of Carnations, and the quantity of flowers produced by the Peas is very much greater. Of course, Carnations may be grown in houses that would be considered not high enough, or not the best adapted, for Sweet Peas, but, in any case, most of the modern houses are big and roomy. More will be said as to cost and yield later; but the first question is that of prices.

The ruling prices in the four chief markets have been mentioned in the Introduction, and weekly quotations from the chief wholesale flower markets form a section of the present chapter. From these lists the reader can satisfy himself fairly accurately as to the probable returns in cash that he may receive from the wholesalers, deducting, of course, the usual 15 per cent. commission charges.

It is interesting, and helpful also, in forming an opinion as to the trend of the market throughout the three seasons when Peas are obtainable, to have before us the comments by reliable market reporters, and these are arranged hereunder.

CHICAGO.—There has been a good demand for Winter Sweet Peas in this market. Despite the long continued



AN EFFECTIVE EXHIBIT OF MODERN, LONG-STEMMED SWEET PEAS

gloom of the early Winter last year, there was a large supply of Peas, many of which were very fine and the highest prices produced were from \$2 to \$3 per hundred sprays. The older Winter blooming type was little in evidence the whole season. During the early part of March—indeed, during the whole of that month—there was a plentiful supply at prices from \$1 to \$1.50 per hundred. It seemed that Peas of choice quality appealed to all buyers. They seemed to be irresistible. A market report for March 17th, however, said that the price was not high then, as there were so many on the market that the higher prices could not be expected. Whenever the poor stock gave way to only high-grade flowers, prices at once advanced, and \$1.50 to \$2 per hundred was readily got for long-stemmed Spencers.

During Easter the supply was quite inadequate, but immediately afterward there was abundance and all of excellent quality. The top prices for the best stock was then \$1.50 per hundred and downward. By Memorial Day the influx had considerably lessened and the flowers were not so good as they had been, the top prices falling to \$1 a hundred. A revival in demand occurred during June, when all good stock sold well. Naturally the poor stock was left on hand, but the Sweet Pea market cleared more satisfactorily than did much of the other stock.

By the middle to the end of June the outdoor stock comes in and quotations remain fairly steady at 50c. to \$1 a hundred. The outdoor crop in Chicago has never much effect on the market. Periodically the Peas were of poor quality, and the demand was equally so. During July and August the outdoor crop yielded in fair abundance. Shortly after the first Eastern Violets reach this market the earliest of the indoor Peas are cut, this being around



THE NEW SUMMER-FLOWERING SWEET PEA FRILLED PINK

November 10, at the time when Paperwhite Narcissi and Stevia come in. By the end of November the Peas begin to come in freely, but the demand cannot be said to be brisk, as there is so much other stock on the market, and during December the quality of the Peas improves as a rule.

PHILADELPHIA.—On this market the new crop at the end of October moves slowly, as it does on all the markets, until about the end of November, when a slight increase in the prices may be expected, more or less, according to the quantity arriving. Around Christmas the stock increases and continues to do so during the month of January, and has hitherto met with very satisfactory demands at prices from \$1.40 to \$2 for the best Spencers. Excellent long-stemmed flowers come in at the end of January, and have met with a strong demand.

The finest stock in February has sold at the high figure of \$3 a hundred, but this was an exceptional price, for usually the selling rate was 40c. to \$2 a hundred, the latter being for the finer grades. Sweet Peas, like most other flowers, come in earlier on the Philadelphia market, and pass off more quickly than on the other more northerly or more easterly markets.

During the whole of March there is an abundant supply of Peas with prices that, as a rule, are very satisfactory. It is now that the highest quality is seen, and these conditions prevail until about the middle of May, when Peas frequently become a drug on the market and are hard to move, especially the short-stemmed flowers. Even the Spencers deteriorate, especially if the weather is hot; this also causes supplies to fall off rapidly. It is then that a further influx of good flowers will sometimes meet with a sharpened demand, causing the market to clean up much better. By the third week of the month

the earliest of the outdoor Peas come in and are usually much fresher and a decided improvement over the indoor stock. These meet with a fair demand, and continue until the hot weather may thin out the substance of the flowers and cause a change in the taste in regard to them.

NEW YORK.—The condition of the market in this city, so far as Sweet Peas are concerned, remains about as stable as anywhere throughout the country. The high prices sometimes realized in the cities of the Middle West are seldom equaled in New York, but the average for the best flowers comes out at \$1.50 for the Winter period.

During January there is an increasing supply and the ordinary Winter varieties have hitherto met with moderate demand at from 50c. per dozen bunches for those with short stems, no matter how good the flower, to \$1.50 per dozen bunches for those with long stems and choice flowers. When there are limited supplies of the Spencer varieties they may realize from \$1.50 to \$2 per dozen bunches. In the middle of February the supply is large, and the best of the ordinary varieties have sold at from \$1 to \$1.25 per dozen bunches. Winter flowering Spencers are disposed of at from \$1.50 to \$2.25. During March, in the last year or two, the market was very fully supplied with Peas of all sorts, and the stock was disposed of at from 50c. up to \$1 per dozen bunches, the Spencers at from \$1 to \$2, all of them meeting with a fair demand.

As the season advances the tendency is for heavier supplies to come in, and by the early part of April there are so many other flowers to compete with that prices for Sweet Peas are apt to decline. However, good Spencers usually maintain a leading place, but the ordinary or grandiflora varieties sell less readily. In past years the grandifloras have acted somewhat as a check upon the

Spencers in regard to their sale, especially when the former have been at their best.

By the middle of May the Daffodils, early greenhouse grown large Gladioli, with the Spanish Irises, Tulips,



PROF. A. C. BEAL

Who has charge of the Trials for the American Sweet Pea Society at Cornell University, Ithaca, N. Y., and whose "Sweet Pea Studies" contain many valuable records

and other flowers set even a faster pace for the Sweet Peas. However, it is gratifying for the grower of the latter to know that several times last season, out of all these items, about the only one that met with a fairly

active demand throughout was the long-stemmed Spencer Peas.

During the Spring, from the end of April onward, there has been an abundant supply of good quality Sweet Peas, and at times, with the influx of other flowers, the prices have not always ruled very high. Quantities sometimes go to waste or are left unsold.

Easter usually brings a good call for, and the re-



DECORATIVE VASE OF WINTER SWEET PEAS

ports give evidence of, a continued supply during June, which sells at 50c. to 75c. per dozen bunches for the best ordinary, and \$1 to \$2 for Spencers.

The indoor Peas now begin to pass, and by June 16 only poor flowers are usually being sent to market. The

outdoor stock arrives around the third week in June and continues so during the whole of the next month. Many have to be thrown away during hot spells.

By the end of October the new supply begins, and continues increasingly thereafter, notwithstanding the presence of so much other stock on the market. During November sales have ruled low, but the advance begins when the Chrysanthemums ease off.

BOSTON.—Large supplies are always obtainable in this market in good quality early in January, and the superior merit of the flowers continues generally throughout the Spring, particularly if there is an abundance of sunshine. The ruling price seems to be \$1 a hundred for the ordinary type, and \$2 for the Spencers. Generally the Sweet Pea trade is an important section of the flower business, especially during February, March and the early part of April. So long as the fancy flowers are produced the demand seems to be satisfactory at the prices already quoted. In 1914, in the middle of May, the supply was very heavy, so much so that the Peas were sold at \$1.25 to \$3 per thousand! Fancy Spencers in many cases wholesaled at 40c. per hundred. That, of course, was owing to the warm weather and the over-abundant crop.

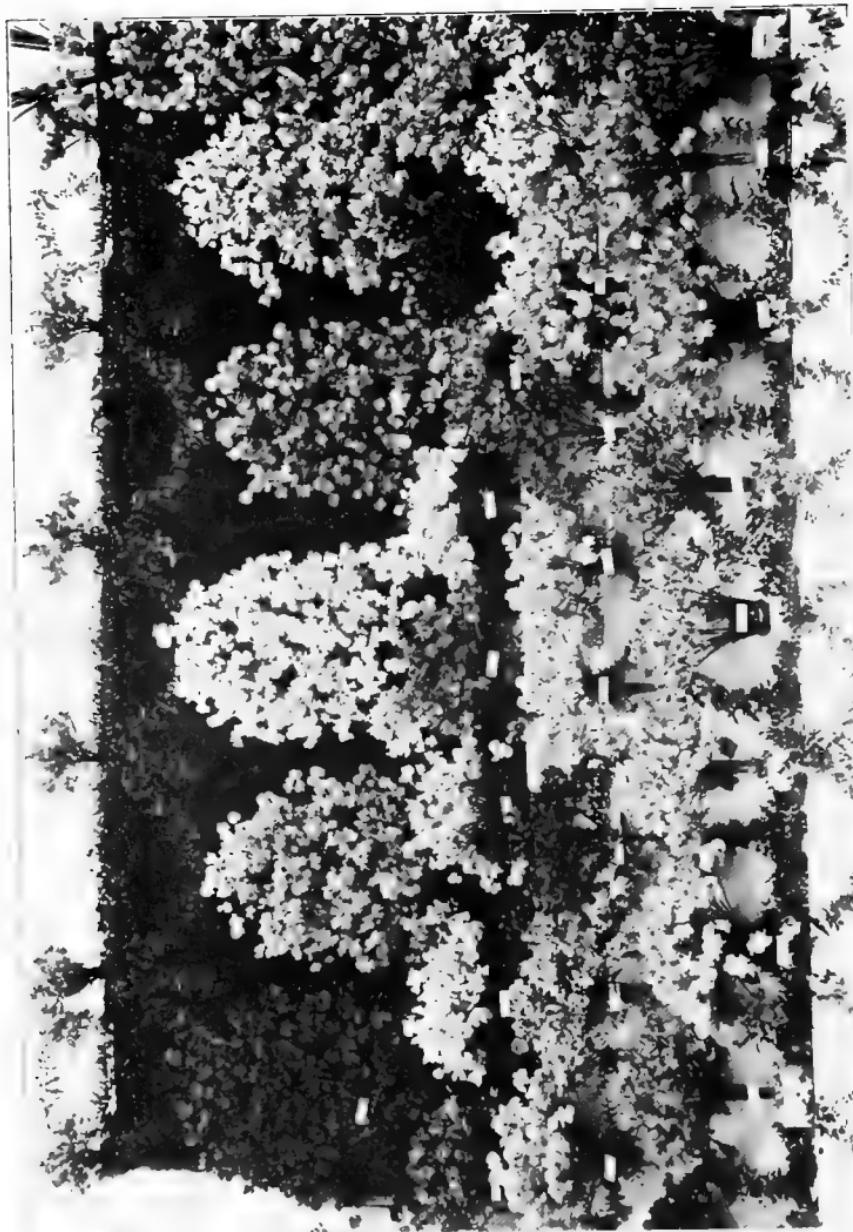
During June the reports indicated an abundant supply, with sales occasionally fairly brisk, at other times rather poor. The outdoor supply begins at the end of June, and, of course, much depends on the Summer as to whether the flowers will be plentiful or the reverse, and also has its bearing upon the quality. By the end of October the new crop indoors begins to appear and its first prices may be rather low, although occasionally fancy figures are obtainable, according to the quality of the stock and the chance condition of the market.

Average Market Prices, 1913-14

The prices are per 100 except in the case of New York, where quotations
are per dozen bunches.

DATE	Baltimore	Boston	Buffalo	Chicago	Cincinnati	Detroit
	\$	\$	\$	\$	\$	\$
Jan. 6	1.00-1.50	.75-1.00	.50-1.00	1.00-1.50	1.00-1.50	1.00-3.00
Jan. 13	1.00-1.50	.75-1.00	.50-1.00	1.00-1.50	.75-1.00	1.00-3.00
Jan. 21	.50-1.00	.75-1.00	.50-1.00	1.00-1.50	.75-1.00	1.00-3.00
Jan. 27	.50-1.00	1.00-2.00	.50-1.00	1.00-1.50	.75-1.00	1.00-3.00
Feb. 3	.....	.50-2.00	.50-1.00	1.00-1.50	.....	1.00-3.00
Feb. 9	.....	.50-2.00	.50-1.00	1.00-1.50	.50-.75	1.20-1.80
Feb. 17	.....	.35-2.00	.50-1.00	1.00-1.50	.50-.75	1.20-1.80
Feb. 24	.....	.25-1.50	.50-1.00	.....	.50-.75	1.25-2.25
Mar. 2	.40-.75	.....	.50-1.00	.....	.....	.....
Mar. 10	.....	.35-1.20	.50-1.00	.50-.75	.35-.50	.....
Mar. 17	.....	.25-1.00	.50-1.00	.50-.75	.....	.....
Mar. 24	1.50-2.50	.40-1.00	.50-1.00	.50-.75	.35-.75	2.00-6.00
Apr. 1	1.50-2.50	.40-1.00	.50-1.00	.50-.75	.35-.75	.....
Apr. 7	.....	.40-1.00	.50-1.00	.50-.75	.35-.75	.....
Apr. 14	.....	.50-1.50	.50-1.00	1.00-1.50*	.35-.75	1.50-3.00
Apr. 21	.....	.35-1.00	.50-1.00	.50-.75	.35-.75	1.50-3.00
Apr. 27	.....	.35-1.00	.50-1.00	.....	.35-.75	2.00-3.00
May 12	.....	.50-.75	.50-1.00	.....	.35-.75	2.00-3.00
May 18	.....	.50-.75	.50-1.00	1.00-1.50	.35-.75	3.00-5.00
May 26	.....	.35-1.00	.50-1.00	.....	.35-.75	1.50-3.00
June 2	.....	.40-1.00	.50-1.00	.....	.35-.75	.....
June 9	2.40	.40-1.00	1.80	1.00-1.50	.....	1.50-3.00
June 15	.20-.50	.40-1.00	.50-1.00	.....	.35-.75	1.50-3.00
June 23	.20-.50	.40-1.00	.....	.50-.75	.....	.....
June 30	.15-.40	.40-1.00	.....	.50-.75	.....	.....
July 8	.15-.40	.40-.75	.....	.50-.75	.....	.....
July 17	.25-.50	.40-.75	.....	.50-.75	.....	.....
July 21	.....	.40-1.00	.....	.50-.75	.....	.....
Oct. 7	.....	.....	.....	.75-1.00	.....	.....
Oct. 14	.....	.....	.....	.75-1.00	.....	.....
Oct. 21	.....	.....	.75-1.00	.75-1.00	.....	.....
Nov. 4	.....	.75-1.00	.50-.75	.75-1.00	.....	.....
Nov. 12	.....	.75-1.00	.50-.75	.75-1.00	.....	.....
Nov. 18	.....	.75-1.00	.50-.75	.75-1.00	.....	.....
Nov. 25	.50-1.00	.75-1.00	.....	.75-1.00	.....	.....
Dec. 3	.50-1.00	1.00-1.50	.....	.75-1.00	.50-.75	.50-1.00
Dec. 9	.75-1.00	.75-1.00	.75-1.00	.75-1.00	.50-1.00	.50-1.00
Dec. 16	.75-1.50	.75-1.00	.50-1.00	1.50-2.00	.50-1.00	.50-1.00
Dec. 23	1.00-1.50	1.00-1.50	.75-1.50	1.00-1.50	.50-1.00	.....
Dec. 30	1.00-1.50	1.00-1.50	.75-1.50	1.00-1.50	.75-1.00	.....

* Shows price on Spencers.



SUMMER-FLOWERING SPENCER SWEET PEAS AT A HORTICULTURAL EXHIBITION

Average Market Prices, 1913-14

The prices are per 100 except in the case of New York, where quotations
are per dozen bunches.

DATE	Milwaukee	New York	Pitts.	Phila.	St. Louis
Jan. 6.	1.50	.50-1.50	.75-1.50	.50-1.50	.40-.75
Jan. 13	1.25	.50-1.50	.50-1.25	.40-2.00	.40-1.00
Jan. 21	.75-1.50	.50-1.50	.50-1.25	.40-2.00	.50-1.00
Jan. 27	.75-1.00	.50-1.50	.50-1.25	.40-2.00	.50-1.00
Feb. 3.	1.50	.50-1.50	.50-1.25	.40-2.00	.35-.75
Feb. 9.	.75-2.00	.50-1.50	.50-1.25	.40-2.00	.35-.75
Feb. 17.	1.50	1.50-2.25*	.....	.40-2.00	3.00
Feb. 24.	2.00	.25-1.00	.50-1.00	.50-1.50	.....
Mar. 2.	.....	1.00-2.00*	1.80	.25-1.50	.....
Mar. 10.	.75-1.00	1.00-2.00*	1.00-3.00	.20-2.00	1.50-1.80
Mar. 17.	.35-.50	1.00-2.00*	1.00-3.00	.20-2.00	.25-1.00
Mar. 24.	.50-.65	1.00-2.00*	.75-3.00	.20-1.50	.25-1.50
Apr. 1.	.....	1.00-2.00*	.....	.....	.....
Apr. 7.	.....	1.00-2.00*	.....	.....	.....
Apr. 14.	.75-2.00	1.00-2.00*	.50-1.25	.....	.35-1.50
Apr. 21.	.15-.75	.50-1.00*	1.00-2.00	.20-2.00	.20-1.00
Apr. 27.	.15-.75	.50-1.00*	1.00-2.00	.20-1.25	.20-.75
May 12.	.75-1.50	.50-1.00*	1.00-2.00	.20-1.25	.20-.75
May 18.	.15-.25	.50-1.00*	1.00-2.00	.20-1.00	.75
May 26.	.75-1.00	.10-.25	1.00-2.00	.15-1.00	.75
June 2.	.75-1.50	.25-.35*	1.60	.20-.75	.75
June 9.	.25-1.00	.10-.50	1.50-2.00	.10-.75	1.50-1.80
June 15.	.25-1.00	.10-.50	.50	1.80-2.40	.25-.50
June 23.	.35-1.00	.25-.50*	.25-.75	.20-.50	.25-.50
June 30.	.75-1.00	.10-.35	.25-.75	.20-.75	.25-.50
July 7.	.75	.10-.25	.25-.75	.20-.50	.....
July 14.	.50-.75	.20-.40*	.25-.75	.20-.75	.....
July 21.	.....	.10-.25	.....	.20-.50	.....
Oct. 20.	.15	.20-.40*	.....	.....	.....
Oct. 27.	.15	.30-.50	1.50-2.00	.35-.60	.....
Nov. 3.	.75	.30-.50	1.50-2.00	.40-.50	.....
Nov. 10.	.75	.75-1.00	1.50-2.00	.15-.75	.....
Nov. 17.	1.25-1.50	.25-.60	1.50-2.00	.15-.25	.....
Nov. 24.	.15-.25	.30-.75	.50-1.00	.15-.25	.....
Dec. 8.	1.50	.50-1.00	.75-1.00	.75-1.25	.....
Dec. 15.	1.50	1.00-1.50	.75-1.00	.40-1.00	.....
Dec. 22.	1.50	1.00-1.50	.....	.50-1.00	.....
Dec. 29.	1.50	1.00-1.50	.....	.50-1.50	.....

*Shows price on Spencers.

CHAPTER II

COST OF PRODUCTION AND PROFITS

As time advances, and better varieties, or varieties that are more productive over a longer period, become procurable, it will be necessary, more than it is at the present moment, for growers to keep tab on the yield and returns from each variety or kind. It will be as essential for the grower to do this as it is for the successful Carnation grower to rid himself of stock of Carnations which fails to produce the largest yield of the best flowers. Reasonably accurate records of the yield and cost of production should be kept, the prices being tabulated, and comparison made of the varieties at the end of the season in order that the true position of affairs be understood. In that way there will be an inducement for raisers to redouble their efforts and for growers to become keen selectors.

The question of the cost and kind of house, such as are found under ordinary circumstances in the vicinity of many of our large cities, has been dealt with in Chapter III on Houses for Sweet Peas. It may be said that the market for Peas varies greatly in accordance with the quality, but if the quality and crop are both satisfactory, a house 100 ft. x 20 ft. ought to produce from \$750 to \$1000 gross. For a house this size the grower requires at least one pound of seed of the best and most vigorous growing newer varieties, or as much as three pounds of the older grandiflora varieties. The cost of the finer new Spencer kinds is as much as \$8 to \$12 an ounce, and if one is growing for the open market it pays to have the very best; indeed, it is doubtful if the cheaper strains are worth growing unless for a private trade, or for furnishing flowers for certain



THE NEW SWEET PEA FRILLED PINK, UNDER GLASS, FLOWERING
IN APRIL

kinds of retail floral work. From seeds sown in the middle of September, say the 15th, flowers can be cut from the resulting plants in a period of fourteen to sixteen weeks, and the time that the plants will yield a profitable crop of blooms will vary from eight to twelve weeks. It is contended that the new Australian variety, Yarrawa, will bloom well for three months continuously.

But a great deal, of course, depends on the cultivation that is given. If the plants are in shallow benches or in soil with a less depth than 3 feet, it is doubtful if, with all the other care one can give, the crop of blooms will continue longer than five or six weeks at most.

The late Robert Sydenham, a well-known English seedsman, made the following statement as to yield. (See "All About Sweet Peas," 1910, page 18): "As an example of what Sweet Peas will do, I have sown the seeds 3 feet apart, and have been able to gather from 450 to 500 sprays of bloom *from one single plant*, and I have on one or two occasions picked about 50 sprays of bloom from one plant at a time. One of my correspondents also wrote me on October 6, 1905, saying, 'From the produce of 420 seeds I have given away quite 40,000 sprays of bloom, and the plants are still flowering.' A reverend gentleman said, 'Eight shillings' (\$2) worth of seed gave me a crop from which I have sold nearly £10 (\$50) worth of cut flowers for charitable purposes.'"

We would not, however, encourage the reader to expect "500 sprays of bloom from a single plant." The firm of Dobbie & Co., Edinburgh, Scotland, which is unexcelled by any in the United Kingdom for the raising and growing of Sweet Peas, whose house of these plants in bloom is illustrated in this book, grow 1200 plants for exhibition blooms, the rest being left to develop for seed. The house

is 120 ft. by 30 ft., and about 30 sprays per plant are cut for exhibiting at shows. The great majority of the spikes have four blooms each, some have even five or six blooms, and a small proportion have three, the stems being about 18 in. long, on the average. These blooms, so beautifully exhibited as they are at the chief flower shows in the British Isles, furnish an invaluable advertisement for the firm, over and above which it may be safe to estimate that half an ounce of seed is harvested from each plant, making 600 ounces in all. That quantity of seed of first class varieties, at \$8 an ounce, would, in America, represent a splendid income, and even at \$4 an ounce would pay handsomely. It is a matter for wonder that some of the leading seed houses do not grow choice Sweet Peas for seed in this way in the United States.

In the Introduction it has been pointed out that prices ranging from 6c. to 25c. apiece are being asked and got for novelties at Chicago and elsewhere, and in regard to this matter of cost the expression of an Irish friend and raiser of Peas deserves to be quoted, as follows: "I must say that so long as the public receives good, sound seeds of fixed varieties at prices ranging from 6c. for 10 seeds of new varieties, to 6c. for 25 seeds of others, folks have nothing to complain of, and I would like to see the trade fall into line, and one and all stick to these or very similar prices. No really striking novelty is dear at 6c. for 10 seeds, while 25c. for 12 seeds of other novelties is enough." —("Sweet Pea Annual," 1911, page 32.)

Here is a little sum for those who delight in figures. Suppose a man has one Sweet Pea seed of a novelty in April, 1915. He sows it and a healthy plant results. The flowers and pods from this plant may yield, say, 100 seeds. In April the following year he sows these hundred seeds,

and allowing for weak or imperfect germination and other incidentals, 85 per cent. should produce seedlings, each plant yielding another 100. At the end of 1916 the grower would have harvested 8500 seeds. Or assuming that through lack of care (an unlikely contingency in the case of a novelty) half the plants succumbed to drought, or aphis or mildew, or some other cause, and that only 4250 seeds were got, if these were sown in April, 1917, the crop by August of that year should have equaled, say, 425,000 seeds. Deducting fifteen per cent. failures in germination the next Spring, we still obtain 361,250 plants for the crop of the Summer of 1918, the fourth year, and if only one-sixth of an ounce of seed is produced by each (about 50 seeds) since the same liberal care cannot be given to each plant, the result would be the huge quantity of 18,062,500 Peas. But in case any one might think this too high a figure, divide this total by five or even six, if you like, and there still remain 3,010,416 seeds, which, at an average of 350 to the ounce, makes 8315½ ounces. At \$1 to \$4 an ounce wholesale (and sometimes \$10 and \$12 an ounce is paid) it would seem that novelty raising in Sweet Peas is pretty fairly remunerative. At the same time an enormous amount of patient work, coupled with many disappointments, is necessary before even one good new variety can be expected, as a rule.

A house 130 ft. by 30 ft., with rows 120 ft. long, may be planted with eight rows, 30 in. apart, or seven rows at 3 ft. apart, leaving a small amount of bench room all around. Of course, the rows may be run transversely across the house. The same amount of seed would be required in any case, namely, some 15 or 16 ozs. Allowing for 20 per cent. failures in germination, or even more, the number of resultant plants may be estimated at roughly 4850. If each plant furnishes an average of two to three



SWEET PEAS FOR SEED

The size of this house is 120 ft. by 30 ft. The number of plants set out in it is 1200 (four plants in each of 300 10-inch pots). These plants are taken up as single stems, all side growths, except flower stems, being taken out. The seed is sown in the first week in October, and the first flowers are cut from the plants in the middle of April; the last at the end of July. The varieties, so far as we know, have been wholly the Summer flowering Spencers. The biggest cutting at one time was 2400 spikes. The plants are not forced in any way, fire heat only being used to keep out frost. The crop is solely for the production of flowers for exhibition and for seed.

blooms per week throughout the flowering season, the yield would be 9700 and 14,550 respectively. From this it will be seen that much more than the usual distance between the rows and between the plants, too, could be spared and still have a highly satisfactory crop of blooms. Nor should it be forgotten that the finer flowers invariably sell at a quarter more per 100 than those of less quality.



SUMMER-FLOWERING SPENCER SWEET PEA INSPECTOR
(BRILLIANT ORANGE)

A successful northern New York grower has two recently built houses devoted to this crop, the houses each being 130 ft. x 30 ft. Neither of the houses is entirely filled with the Peas, which are sown in September in solid beds in the center of the house, and the plants are 8 in. apart each in the rows. The vines are run up on binder

twine to a height of 15 ft. A picture of the crop as it appeared in March, 1914, appears on page 39. Cutting in the first house began on December 17, in the second on February 18. The first cuts sold at \$1 per 100, and continued at that figure for a month, then dropped to 75c. per 100, which price was maintained till after Easter, when it fell to 70c., and up to the end of May over 215,000 salable flowers were picked. The gross returns were \$1700. Christmas Pink was largely grown, and others of Zvolanek's varieties. Basing our calculations on these actual figures it will be seen that for a closer planted house, or one more fully filled with the Peas, the figures already mentioned easily hold good. The actual yield from the two houses referred to, was as follows :

YIELD FROM TWO HOUSES, EACH 130 X 30 FT.

Date	Weeks	No. of Sprays
Dec. 24	1st	1,000
Dec. 31	2d.	2,000
Jan. 7	3d.	3,000
Jan. 14	4th.	5,000
Jan. 21	5th.	4,000
Jan. 28	6th.	6,000
Feb. 4	7th.	7,000
Feb. 11	8th.	8,000
Feb. 18	9th.	9,000
Feb. 25	10th.	10,000
March 4	11th.	7,000
March 11	12th.	7,000
March 18	13th.	9,000
March 25	14th.	10,000
April 1	15th.	*28,000
April 8	16th.	20,000
April 15	17th.	22,000
April 22	18th.	20,000
April 29	19th.	18,000
May 6	20th.	19,000

215,000

* For Easter week. The contract was for 40,000 blooms, but though extra heat and water were given, the cut fell short by 12,000 sprays.

As against the returns, we have the expenditure side of the account, estimated as under, *for each house*:

Sept. to May 6, inclusive.

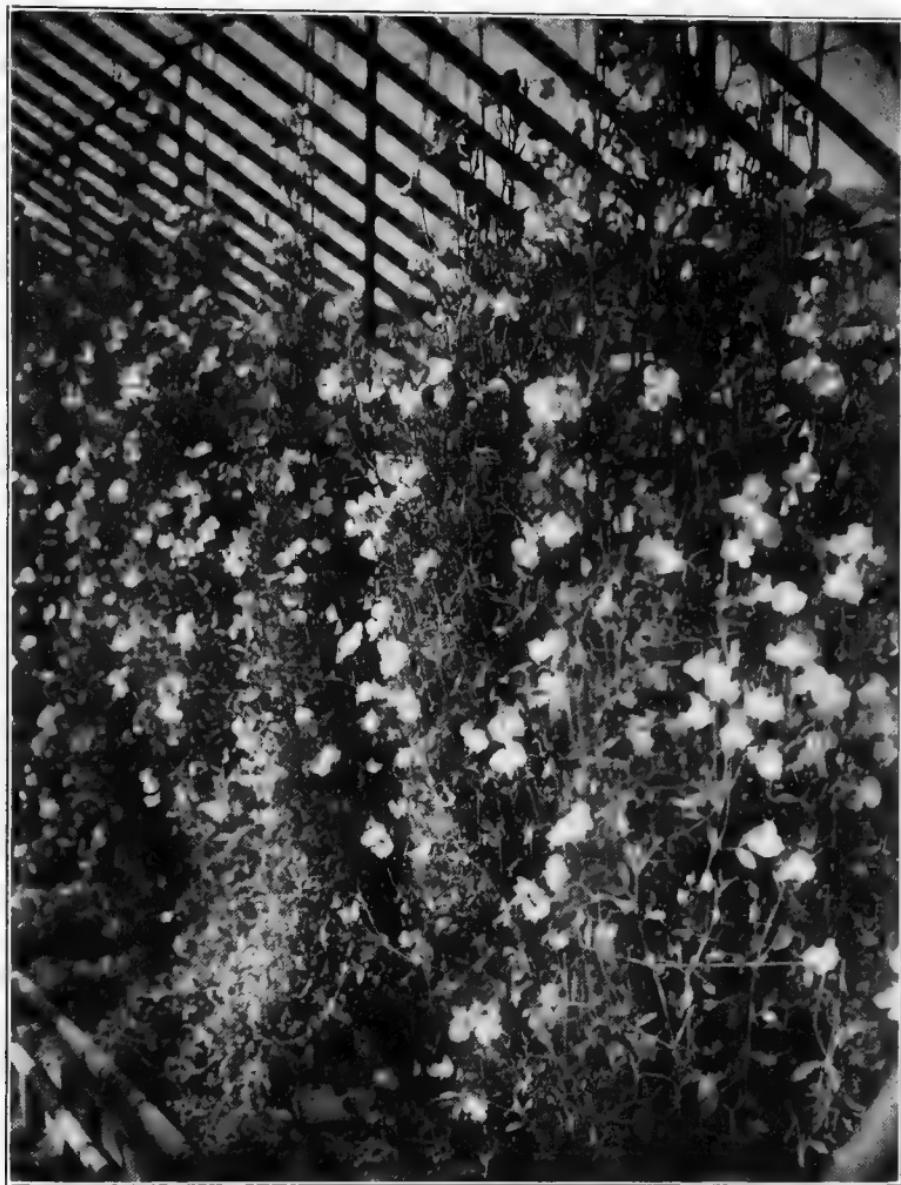
Interest on investment.....	\$100.00
Depreciation, eight months.....	50.00
Fuel.....	80.00
Labor.....	225.00
Seed.....	35.00
Fertilizer, fumigants and stakes.....	55.00
	<hr/>
	\$545.00

The cost of fuel is based upon the average cost of a single house with independent heating plant, and may be reduced where an efficient central heating apparatus is used with a lower grade of fuel. It should be noted, too, that the increase in the value of the land would in certain cases offset the depreciation account considerably.

Analyzing the profit and cost of the two houses, we therefore arrive at the following results:

Gross returns.....	\$1700.00 (or \$850.00 for each house)
Gross expenses.....	<u>1090.00</u> (or \$545.00 for each house)
Total of profit.....	\$610.00

From this, of course, would have to be deducted freightage and commission charges where the flowers were sent to the wholesale market; but, on the other side of the account, as the owner of the greenhouse or greenhouses may do all the necessary work himself, or with assistance from his wife or family, the sum of \$450 for labor can be added to the above net profit account, which would then make it \$1060. During the same period the side or bench crops (allowing for a minimum of 600 sq. ft. of bench space at 30c. profit per foot) would yield \$180, bringing up the net income to \$1240; and with a crop of Tomatoes during the Summer months, \$400 to \$500 more can be added, making the grand yearly total \$1740. Or the Sweet Peas could be continued until the middle of June,



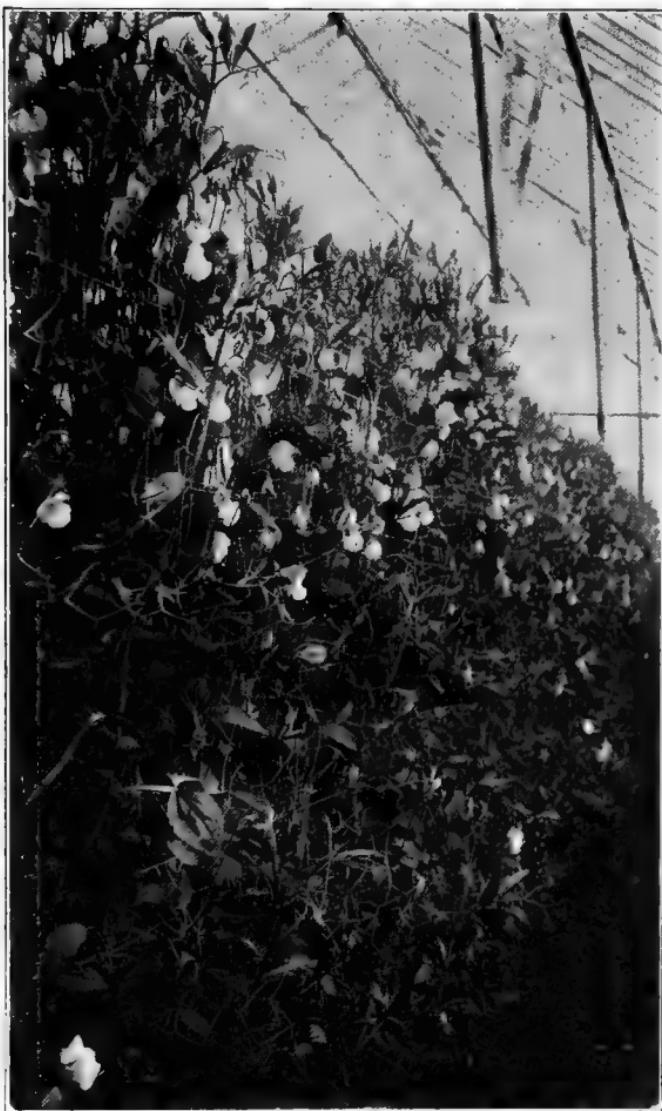
SECTIONAL VIEW OF GREENHOUSE SHOWING THE FLORIFEROUSNESS
AND HABIT OF GROWTH OF THE NEW ORCHID TYPE
OF SWEET PEA ROSE QUEEN

as in the case of the grower already mentioned, whose total crop of marketed blooms amounted to 288,000.

Where the grower is at the same time a retail florist, he can, of course, add still more to the direct profit from his houses. Instead of \$6 for 600 sprays, he might use these in making a wreath for which he may charge \$25. On the other hand, he may be caught with 500 old flowers in the cooler which could have been bought for less than \$3 per 100, and make the best use of them in a \$5 pillow.

These figures, on both sides of the account, are to be regarded as approximate only, for we all know that in the flower growing business a really scientific costs system is difficult to formulate. The vagaries of the weather upset calculations, and the crop yields vary from year to year. Disease may run riot, or incalculable harm may be done to a crop by the want of ventilation, or by giving ventilation untimely. Prices of labor, coal and water vary, all of which may and do alter the annual returns and profits. Nevertheless, keep accounts—the more accurate the better. In your own case they will be of distinct benefit. Without them no man can conduct his business safely. Have time sheets and charge sheets, and observe which varieties crop best and which colors or forms are in demand.

"Cost of crop production records, to be of the greatest value," says a high authority, "should cover a consecutive term of years. Only by this means can an average cost of production be determined. Very few crops are either highly profitable or ruinously unprofitable every year. Most crops have their good and their bad years, from the standpoint of profits, and only by records extending over a term of years can the relative profits or losses of the fat and lean years be compared and the normal, or average, cost of production and profit determined."



SWEET PEA CHRISTMAS PINK UNDER GLASS

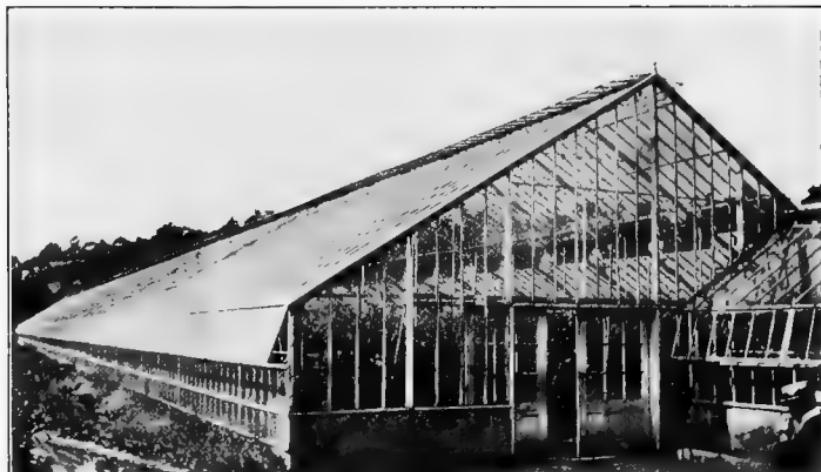
CHAPTER III

STYLE OF HOUSE AND HEATING

The Sweet Pea house must be in an open and sunny position, sheltered, if possible, from winds. It should be kept in mind, however, that contiguity to low hills may result in trouble with the chimney stack, owing to down drafts. The size and number of the houses will naturally be determined by the capital the grower has to expend upon them. A florist can make a profitable income from the crops grown in a couple of span houses 20 ft. x 120 ft. or better, 30 ft. x 130 ft., taken in conjunction with, say, from half to one acre of land surrounding them. Provision must also be made for a service house, and of course for small houses or frames that can be used as propagators and feeders for the main house. Beneath the service house there should be a clean cellar and packing room for the cut flowers, or this can be attached on the same level as the plant houses; likewise, provision should be made for the water supply and for a manure tank. These, however, might be at some distance away.

If the house runs east to west (which is best), the rows will run lengthwise. In the larger houses, however, it does not matter so much in what direction the house runs, for the shadows caused by the roof members are so diffused as to be rendered almost negligible. Wooden houses are slightly cheaper at the first cost than those of iron or pipe construction, but where possible, the latter should be preferred.

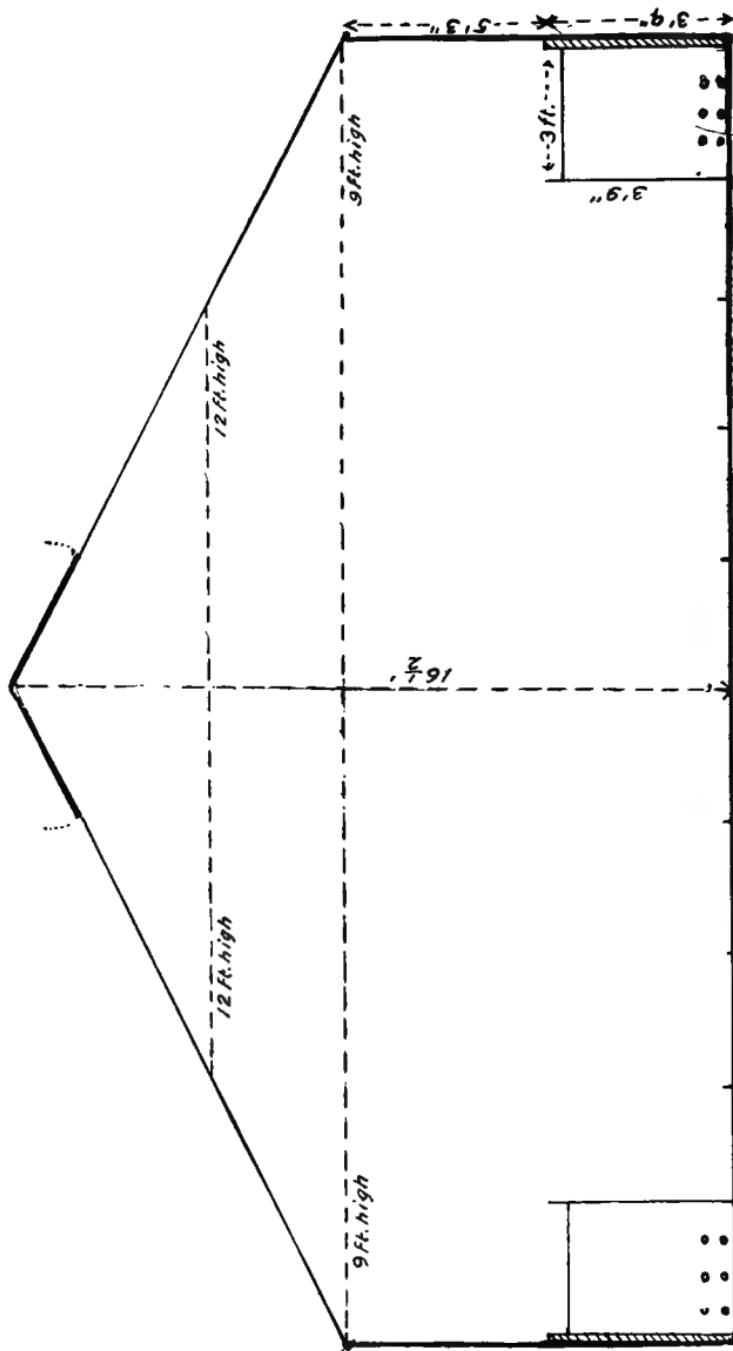
The use of steel members makes for a lighter type of house since a 3-in. rafter is as strong as a much larger and heavier wooden one. In the line of progress the gutter also has been reduced and is made of cast iron. The use of steel allows the building of larger houses and by means of scientifically devised methods of roof construction and



ONE OF WM. SIM'S LARGE, MODERN SWEET PEA HOUSES AT CLIFTONDALE, MASS.

tie devices for strengthening these structures, even those of great width are made perfectly safe.

"Contributory to their success has been, in conjunction with the iron frame, a scientifically devised method of roof trussing, utilizing steel angles or flat bars for all truss members other than the tension rod, thereby enabling them



CROSS SECTION OF GREENHOUSE FOR SWEET PEAS

The breadth is 30 ft.; height to ridge, $12\frac{1}{2}$ ft.; height to eaves, 9 ft.; with 3-ft. bench all around. Seven rows of Peas at 3 ft. apart could be grown. The length is presumed at 130 ft. and there are six rows of 4-in. piping; also side and top ventilators

to resist either tensile or compression strain which may be applied according to the direction and pressure of the wind. So independent does the roof thus become of column supports that it is now compatible with the best



SWEET PEA HOUSE AT HAROLD MORGAN'S, AUBURN, N. Y.

of practice to construct houses 40 ft. wide without columns, those up to 65 ft., inclusive, requiring but one on each side of the roof and two for the 75 ft. width.

"A factor greatly increasing the facility and economy of erection is the system of wrought iron gusset plates by

which the various members of the steel frame are riveted and bolted together. The foundations of the house are concrete piers extending about 3 ft. below grade, in which the wrought iron rafter foot pieces are imbedded. A concrete curtain wall, 4 in. thick, is constructed on the sides, and extends from a few inches below the grade to the cast iron sill, which is an integral part of this mode of construction.”*

As to the ventilation, the largest houses are now fitted with very powerful cog and chain gearing, so that as much as 150 ft. of sash can be parted easily by one man from one point. An interesting fact about the large houses is that practically the same amount of ventilation appears to be sufficient for them as is necessary for the smaller ones. In such gearing the lesser cog wheels are contained within the oil cup and are covered in. The temperature in a large house is much easier to maintain uniformly than in small ones where a smaller body of air is enclosed. This is an important matter in the cultivation of a Sweet Pea crop. Side ventilators are necessary, and at least a ventilator on the top south side should be arranged.

In regard to glazing, the general practice is to adopt the 16 in. x 24 in. glass. Most of the glass is either AA or B glass. Very strong 29-ounce glass is necessary for the larger sized pane; that is to say, the 24 in. x 24 in., and it is questionable whether the increased amount of light got from the larger glass compensates for the extra cost and risks. Some building firms prefer the lapped form of glazing rather than the butted. On this matter we express no opinion, and indeed the grower who intends to build will do well to consult with two or three of the greenhouse

* Henry P. Merrick, in *The Florists' Exchange*.



INTERIOR VIEW OF SWEET PEA HOUSE, SHOWING CROP AT GEORGE SCHUNEMAN'S, BALDWIN, L. I., N. Y.

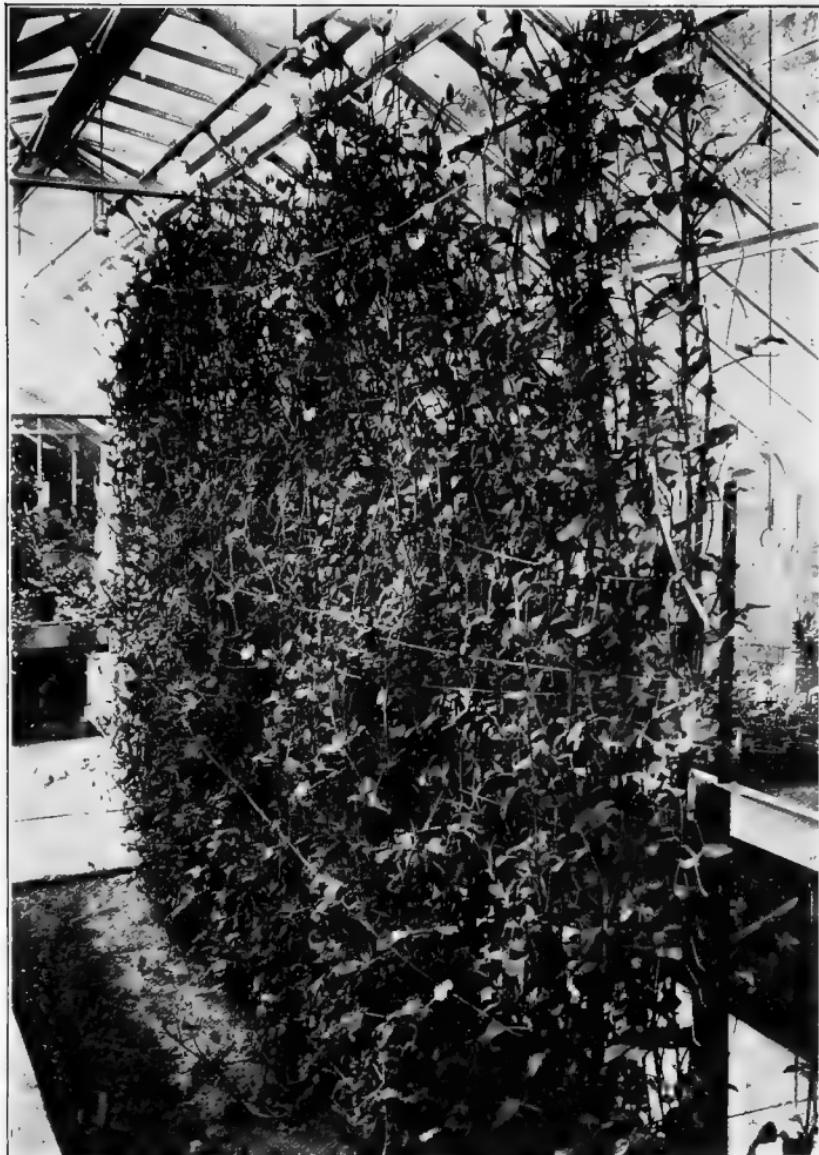
building firms and obtain from them specifications, suggestions and estimates.

One thing that growers ought to bear in mind is to lay their original plans in such a way as to allow for future



MODERN INDOOR CULTIVATION ON THE SINGLE STEM SYSTEM
These plants were grown in pots and the picture shows them at an exhibition

extension or addition to the houses. On this point, in more than one case, owners have been put to great expense, solely owing to the fact that forethought had not been exercised, to the consequent loss in the economical working



WINTER SWEET PEAS IN A PRIVATE GARDEN IN CANADA

of the establishment in later years. The same remark applies, and with greater force, to the heating plant.

HEATING*

In regard to heating, there are two general classes of heating, namely, by hot water and by steam, which may be divided into several different systems. Hot water is the most generally used, as it will hold the heat for a considerable length of time and has some drying effect on the atmosphere, but not as much as steam. This system of heating may be subdivided into two general classes: (a) high pressure or closed system, and (b) low pressure or open system. Low pressure is the most generally used and requires an expansion tank, open to the air at the highest point. High pressure is used in some cases connected directly with the city water main. This system has the advantage of a higher temperature than boiling water on account of the outside pressure. In some cases a circulation is used in order to accelerate the flow of the water through the pipes. There are several different appliances on the market. These may improve some inferior hot water systems and thereby make a saving in fuel.

The most economical system on a place where a night fireman is employed is steam. This system may be subdivided into three parts: (a) gravity, which is the most common; (b) vacuum; and (c) the trap system.

The gravity system is more economical in a hilly section where the boiler may be placed at the lowest point, enabling the condensed water to run back to the boiler and thus save the cost of pumping apparatus and its maintenance.

* By George H. Elliott, in *The Florists' Exchange*.

The vacuum system is used on several large places in the West, where the country is flat and the cost of sinking the boiler house is expensive. This requires a more or less elaborate system of traps and pumps, as the water has to be drawn from the heating pipes by one pump and pumped into the boiler by another, which necessitates the carrying of a high pressure on the boiler and the use of a reducing valve of the heating systems. This system we should not say was economical on any except the larger places, such as are found in the outlying districts of Chicago.

The trap system is used principally through the West, and in places that draw their supply of steam from some central power station. There are various makes of good traps on the market for the florists' use, and the manufacturers gladly give all details as to the proper installation of the same. The rules of keeping the boiler clean apply to either the hot water or steam systems. Either of these systems must be kept water-tight or steam-tight, as leakage in the piping is leakage in the coal pile.

Some florists have tried the burning of a low grade of coal by the use of forced draft, but we should not say that it was economical, as it requires an engine, high pressure steam, and a fan, which draws more or less efficiency from the boilers to operate it.

Put cold water into the system on sunny days, when it will heat up gradually, or at such time as the temperature of the water is higher than necessary.

On a steam system, water should be put into the boiler very gradually, as cold water in large amounts will take away all the steam. Do not put water into a steam boiler when it does not show in the glass: you do not want to wreck your place, and life is too short as it is.

The chimney is as important a thing as anything in

the saving of coal. It should be built higher than the surrounding buildings and trees. If it is built on a hill-side it should be higher than a level line across the top of the hill.

For the heating of a house such as that shown in cross section, on page 38, which is 130 ft. by 30 ft. by $16\frac{1}{2}$ ft., and 9 ft. high at the eaves, it is recommended that as the house would have 5986 sq. ft. of exposed glass, and would require 1730 lineal feet of 4-inch external diameter pipe for a temperature of 50 to 55 deg. at night, with mercury outside at zero; about 12 lines, or 6 lines under each side bench, would be necessary.



CHAPTER IV

CULTIVATION

Sweet Peas like an open and sunny position free from the approach of shade. In a dark or badly lighted house, or in a dull position outdoors, they become drawn, weak, spindly, and may fail to flower. Where there is danger of the flowers being scorched by too brilliant sunshine, as sometimes happens to the orange and blue shades particularly, temporary screens can be fixed up, composed of the flimsiest scrim, cheese cloth, or mosquito netting, which sells at 3c. per sq. ft., stretched between poles, to shade the blooms. Or the glass of the house, in the case of the indoor crop, can be sprayed with limewash.

THE SOIL

No one need attempt to grow the best Sweet Peas if he has a shallow soil or a soil upon which labor has not been spent in preparing it. One of the secrets of Sweet Pea cultivation is a proper soil, and certainly a deep rooting medium. The man who tries cultivating this quick growing annual in a shallow bench or trench of little depth, may get a crop of flowers, and if the soil is rich and is fertilized he may get some blooms that are good while they last, but depend upon it, the flowering period will be short. As it takes twelve to fifteen weeks to get the plant to a blooming condition, it is worth while to prepare the tilth thoroughly and get the best returns over the longest period.

If one consults different authorities as to the kind or quality of soil he will find divergent opinions. Some will

say that any good garden soil is suitable, such as will grow good vegetables, and this is true. Others will say that a light friable loam is best. Certainly the soil must be well drained—that is one of the first essentials. What is described as a deep, mellow soil, either of a brown or dark color, that crumbles into a fine tilth when knocked with a spade, is excellent. Of course, if one could go to the expense of putting in turfy loam this might be considered best of all. Such loam may be cut 3 in. to 4 in. deep from the top of a pasture where the grass and herbage have just been cut for hay, or better still, eaten off by cattle or sheep. Stack such turves into layers in the usual way, and leave for five or six months so that the grass and sod become rotted and mellow. The stack can then be chopped down and be wheeled into the house trenches where the Peas are to be grown.

It is not necessary to do more than fill the trenches with this high class loam, and these should be at least 2 ft. wide and 3 ft. deep; if 4 ft. deep, so much the better.

Such soil, of course, lasts for several seasons if it is enriched with fertilizers; many growers do this repeatedly. Should there have been any disease in the previous crop, however, it will be necessary to re-sterilize the soil, or even renew it for safety, else devote the house to an entirely different crop; or do both.

In the preparation of the soil, if it is found incompatible with the means of the grower to go to so much trouble or expense as to get in special loam, the least that the grower must do is to dig up the soil in trenches where the Peas will be, to a depth of 3 ft. to 4 ft. At 3 ft. to $3\frac{1}{2}$ ft. a 4-in. layer of heavy rotted dung should be put in. Manure from the cow shed, stable, or barn, is recommended. Place

over this another 1 foot of soil and scatter an ounce of bone meal to each one yard run of trench.

If this can be allowed to settle for a week or ten days, so much the better, but this is not essential. The trench should be firmed, however, before sowing the seed, (if sowing is done,) or before planting, if plants are set out.

The worst of the trench system, especially out of doors, is that in dry weather, no matter how much one may water the trenches, there are sure to be chinks or seams between the part that is trenched and the soil that was not so well treated, or in rainy weather the trench becomes a fine ditch for all the surplus water. It is certainly by far the best plan to dig or trench the ground all a uniform depth. The same applies under glass, but there, of course, the cultivator has matters under his control so that the difficulties as to water logging do not present themselves in quite the same degree.

A good point to bear in mind, above all, is that it is useless to attempt to grow marketable Peas in poor soil, shallow soil, heavy, soggy soil, badly drained soil, or on thin, hot soils. The soil must be well drained, deep, moisture holding, yet permeable to the long roots of the plants. The Sweet Pea will go an immense depth in search of moisture. The writer has planted Peas from pots, whose roots were fully 2 ft. long at the time of planting, and as the soil was of untold depth, of a rich, almost peaty, brown, fibrous silt—the acme of perfection for these plants—just how far they descended would be difficult to say. Plants in such soil will produce leaves “like Cabbages” or, to be more definite, the leaves will be as large as the palm of one’s hand and thick, leathery, and green, while the flowers will be of that splendid type that is upheld on 18-in. stems, four blooms to a spray, beautifully waved, or frilled, and

of a rich color having good substance, so that they will last. Peas of the highest quality not only fetch the best prices, but sell more readily, and by their beauty and staying powers they are a testimonial to the seller, whose customer is, therefore, confirmed in regard to their merits, and never hesitates to buy again. Get the best and grow the best; none other pays.

Sometimes a grower will sterilize his soil as for Chrysanthemums and Carnations. The method of working and the apparatus required for soil sterilization are simple enough, excepting only the steam generator. A box 6 ft. long, 3 ft. wide, and 2 ft. high, made so that the two longest sides slip out, will hold about a load of soil. A gridiron arrangement of tubes $1\frac{1}{2}$ to 2 in. in diameter is required for the inside. Each of the three pipes is closed at the end, and perforated with 2-in., and placed alternately at right angles, that is, eight holes to the foot. The grid should be 1 ft. shorter and 1 ft. narrower than the box it is to be used in. A flexible metal tubing to connect up with the steamer completes the apparatus.

To use it, the grid is placed in the box, and raised on bricks 5 in. or 6 in. from the bottom, and the soil shoveled in until the box is full. The grid is then connected up, a tight-fitting lid placed on top of the box, and the steam turned on.

Two important points to remember are to screen the soil first and have it as dry as possible, otherwise the process will take much longer. If a steam pressure of 80 lbs. to 90 lbs. per inch can be maintained for twenty minutes, this will raise the whole of the soil to a temperature of 212 degrees Fahr., and the "cooking" is then finished. To avoid leakage of heat, cover the whole of the box with mats or sacks. After the soil is fully heated it must be



A SPRAY OF WINTER-FLOWERING SWEET PEA YARRAWA

turned out, covered up well to keep the heat in as long as possible, and then the box should be refilled. Such is the simple process now often used. Its cost depends upon individual methods, and varies from 20c. to 50c. a load.

Other means than sterilization by steam are rotation of crops and the use of various disinfectants. Dr. E. J. Russell, director of the Rothamsted Experimental Station in England, has recently done much work in this direction, and has published the results. These, together with the discoveries along the same line by other investigators, have been summed up in various papers. Russell divides the disinfectants proper into three classes, according to their efficiency. In the first class are the strongest, as formaldehyde, pyridine, lutidin and colidin. The second class includes benzol, calcium sulphide, carbolic acid, cresilic acid, light and heavy solvent naphtha, petroleum and toluol. The third and weakest class contains only naphthalin and its derivatives.

The first consideration in applying these disinfectants is whether there are plants on the land to be treated. If there are, and they cannot be removed, only the weaker means can be used which do not injure the roots. The steam treatment is generally too expensive, also formaldehyde, the pyridine bases, benzol and toluol. Benzol, benzine, petroleum and toluol are also dangerous because of fire. The other representatives of the second group are said to be far better.

The so-called California solution, which contains a calciumoxy-sulphide, is largely used against animal and vegetable pests, especially by fruit and Rose growers. An important disinfectant is cresilic acid, with its derivatives, creolin, lysol and carbolineum, which are obtained

by the addition of resin or oil soap. Carbolineum, especially, has been used very successfully against soil exhaustion.

THE SEED

Good germinating seeds will sprout well in from ten to twenty days, and if the seedlings do not appear in that time, investigation should be made. It sometimes happens that seeds may be over-ripe, having a hard shell. Some growers, therefore, always adopt the plan of soaking their seeds for ten or twelve hours; others adopt the plan of burying the seeds for a number of days in flats, in moist soil or in sand, then unearth them to see whether swelling has taken place. If the peas show signs of increased size, and have soft shells, they are on the way to germination. But, on the other hand, if the shells still remain hard, it will be necessary to file them or chip them in some way, so that moisture can penetrate, and allow the germinating seedling to make its way through the coat.

On one occasion we saw seeds of a certain variety sown, and they lay as dead as door nails for three weeks in the ground, while several other varieties had started into growth, but being curious to define the reason, search was made for the seeds that had failed to sprout, and they were found to be perfectly hard. After being filed, however, they germinated perfectly satisfactorily. Of course, where a large quantity has to be sown the filing method is certainly laborious, but it is the only commendable one.

In regard to white flowered varieties, it is well known that some have light seeds and some have black. The light seeds are the least vigorous and oftener fail to germinate than the black ones. It is for this reason it is advised to sow them more thickly and not so deep as the black. They are much more liable to fail in cold soils,

too, especially when planted out of doors. All seeds must be sown in moist (but not wet) soil. A day or two previous to sowing, therefore, see that the soil is well watered, if this is necessary, then plant the seeds when it has become dried off.

The Sweet Pea is productive. A single Pea seed producing a healthy plant will yield upward of one hundred seeds within four months. Usually one seed crop is taken annually, but it would be possible, under the best conditions, to get two crops of seeds per year, but usually about one hundred of the best quality of seeds, as a unit per year, can easily be figured on. An ounce of Sweet Peas contains from 280 to over 400 Peas, according to the variety, the wrinkled varieties being the lightest. At 30 in. apart, we can have about 75 rows, each 200 ft. long, per acre. An ounce of good seeds that germinate 95 per cent. is sufficient to plant an 85-ft. row, the plants being 3 in. apart. If a double row is planted, the plants can be set 6 in. apart down either side, so that the same quantity of seed will still suffice for 85-ft. run. For planting a house 100 ft. by 20 ft., 1 lb. of seed of the newer Winter-flowering Spencers is recommended, as these are further apart in the rows, or 3 lbs. of the smaller flowered older varieties.

SOWING

Indoors we may sow at any time from July until March. After March it is possibly not worth either the labor or space to sow Sweet Peas for an indoor crop. It cannot be too strongly impressed upon the beginner that the Pea, like several other flowers, has its season when it is in good demand, and to produce quantities of Peas the year round is more than likely to satiate the taste in regard to them, and so cause a decided falling off in the general call. Try

to produce the finest blooms for Christmas, New Year, and the early months of the year, and have a good crop for that great flower selling period, Easter, and let other crops also have a chance, so far as such a scheme can be practically carried out.

The very early plants, so far as we have seen, are seldom of the highest quality and have but moderate blooms, which are put upon the market at a time when many kinds of flowers are abundant. Growers, too, who send in flowers of inferior grade, are doing themselves, the Sweet Pea, the salesman, and the public combined, an injustice. Be it understood, it requires much skill and care to raise the early July sown crop, except in the coolest sections of the north or west, for it must be remembered that the weather in August and earlier part of September is often very hot.

A good time to sow is the middle of August. Sow around the 15th, perhaps a little earlier in the more northerly sections. An August sowing, properly treated, will yield an early crop of blooms for Thanksgiving, and so on until after New Year.

William Sim, Clifftondale, Mass., who is well known as one of the largest growers, makes his first sowing before the middle of August, from which flowers are picked about the beginning of October. The second or main crop planting is made about the second week of September, and the third or last planting about the beginning of October. Formerly, that is to say, a year or two ago, Mr. Sim at the third planting favored the fancy colored varieties, which were found to sell better during the Winter months. Plants from the main crop, sown in September, begin to flower about the second week in January, and those from the third crop come in about the middle of March and hold on



WINTER SWEET PEA MRS. WM. SIM
(SALMON PINK)

till the outdoor crop comes again. It is a notable fact that no change is ever made in the soil in the houses, and the fertilizers used are of cow manure and fine ground bone.

Growers not accustomed to Sweet Peas under glass

will find that the early part of September is the best time for them to start.

The Sweet Pea tests at Cornell showed that seeds planted in beds on Sept. 24, 1910, germinated in from 60 to a little over 100 days, according to the variety. Earliest of All and Watchung took 63 days; Snowbird and Blanche Ferry, 66; Christmas Pink, 87; Mrs. Zvolanek, 90; Wallacea, 94; Florence E. Denzer, 96; and Mrs. Wm. Sim, 102. The earliest of the Télemy varieties was Pale Primrose, which took 88 days.

Some growers think that the Summer flowering Spencers are superior to the early types so far as quality of flowers is taken into account, and, indeed, that may be correct as applied to the very best, but they are much slower in coming to maturity, and a September crop would occupy the houses all Winter, and at the best would only begin to provide blooms in any quantity, or of good quality, by the end of March or beginning of April.

The most choice blooms usually come from the later sowings, so that the plants can be grown cool and steadily all the time. This is a very important matter. Never try to force Sweet Peas. Keep them growing steadily in a temperature as nearly between 50 and 60 deg. Fahr. as possible. The conditions of a balmy June cool day should be imitated.

In sowing, a drill may be taken out with a draw hoe 6 in. ~~to~~ 8 in. wide, and 1½ in. to 2 in. deep. Sow the seeds thinly. Now that expensive varieties are likely to be much employed by those desiring flowers of first grade, it will be best in most cases, and certainly wisest, to raise the seedlings in 2½-in. pots, one in each pot, and plant them out. But they must never be allowed to become stunted. In any case, we would suggest that time is well spent when

ERRATUM

Page 57, line 4, for "germinated" read "flowered"

the seeds are sown or planted with the utmost care as to the distance apart. There should be very little necessity to thin the plants. It is a waste of money to sow seeds thickly and then have much thinning to do. Under glass, with seed of good quality, treated as already described, the need of thinning scarcely arises. Outdoors the matter is different, for there one has to contend with changes of the weather and with natural enemies that are not so much under one's observation. If the seeds are planted directly into the soil, place them 3 in. apart if in single rows, but 5 in. or 6 in. apart in the double rows. The latter, of course, means that there are two lines of plants in the one trench, at 5 in. between each line. The soil must be agreeably moist and firm. Soil that readily falls apart after being squeezed in the hand is in the right condition. Cover the seeds and firm the soil moderately with the back of a rake.

SOWING IN POTS

Sowing in small pots is a convenient and generally safe method of raising stock, either for planting outdoors or in the open. Costly varieties, as we have said, are best treated in this way; also to plant out immediately in succession to another crop and so save time, the method of raising the seedlings in pots is the one adopted. It means extra work, certainly, for the pots have to be filled, staged and watered, and the seedlings transplanted, but many growers consider this work pays for itself in the end, and proves a good investment.

Paper pots of the "Long Tom" type are good to use, being long, moisture holding, kindly to the roots and cheap. The 2½-in. ordinary pots are also favored, and one seed may be sown in each. It is a radical mistake to crowd seeds into these pots because the roots, which should be

carefully preserved at the time of planting, must necessarily get broken if there are too many seedlings together. Another point of importance is not to confine the seedlings too long in the pots, else the roots get intertwined and are then difficult to separate.

The soil should consist of fibrous loam, or at least light soil of a good nature, with finely powdered old manure (that from a spent Mushroom bed, whenever it may be obtainable, is the ideal sort) and a fourth part of sharp sand. After sowing the seeds 1 in. deep, place the pots in a house with a temperature of 55 to 60 deg. Fahr., and when they have germinated in six to ten days, gradually lower the temperature to 50 deg., or remove the pots to another house, but avoid a sudden check. Place them on the shelves of a cool, airy house, or upon the ground, or in frames on a soil or ash bottom. The soil being moist to start with, avoid unnecessary watering afterward, and be sure not to get into the habit of merely dewing the surface over, especially when the seedlings are breaking through, as this may lead to damping off. As soon as the little plants are 2 in. to 3 in. high and have well filled the pots with healthy roots, they should be set out in their permanent quarters. Such treatment, of course, is only called for in the case of the more expensive vigorous growing novelties.

SOWING IN BENCHES

Where ordinary flowers are wanted for one's own retail trade, or where the highest ideal blooms are less the desideratum than a quantity of the smaller kinds on medium stalks, that is, with stems 6 in. to 8 in. long, the older grandifloras are excellent. These produce a rapid succession of very useful flowers for make-up purposes, and look as well when packed into a floral cushion or pillow as the

grander flowers do. For this end growers often sow the seeds in raised benches that are only half a foot deep or very little more, using fairly rich soil. Eighteen inches is little enough between the rows: 2 ft. is better, and the seedlings should be left at 4 in. apart in the rows. The purpose of the present book, however, is to emphasize the nobility of choice Sweet Peas and to try to have this fragrant annual lifted to a higher plane. Its real value is too often underestimated, and its cultivation is often a travesty.

Dwarf or Cupid Sweet Peas may be grown in benches and will produce flowers that are good enough for button-holes, but as a rule the stems are short and the Peas are not to be compared with those of the grander kinds that are grown in solid beds. They are decorative as plants, and might be more frequently grown in pots for the conservatories of private places.

Sweet Peas can also be grown on in pots, giving them a shift from 2½-in. pots into 6-in., and from these into 12-in. They must be kept well fed.

SWEET PEAS FROM CUTTINGS

Of this method of propagating, which is occasionally used for increasing novelties or other desirable varieties, J. Chisholm wrote in the "Sweet Pea Annual" for 1910, as follows: "From seeds sown under glass in September we obtain plants that yield growths suitable for cuttings in November. Three cuttings, sometimes four, are placed in a three-inch pot, in light soil, and put in a warm house until rooted. They are then transferred to a cool house and grown steadily. With plenty of light and a free circulation of air, the plants make steady growth, and when they have filled the pots with their roots each potful is

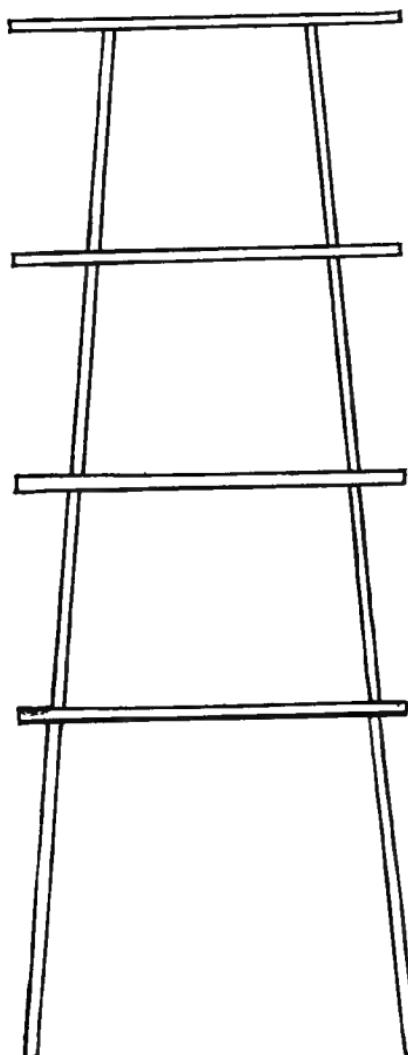
potted into a five-inch or a six-inch pot. No crocks are used for drainage beyond one over the drainage hole, and this is covered with a good layer of crushed bones, while bonemeal is freely used in the substantial potting compost. Under this treatment, and given carefully trimmed sticks for supports, Sweet Peas will grow to a height of from 10 ft. to 13 ft., and flower practically from base to summit, even in these comparatively small pots."

PLANTING

When planting the seedlings either in the open or in houses, avoid setting them deeper than they have been in the pots. A 2-in. depression in the line or ridge is quite enough, and when the plants get into full growth, and have reached a foot or more in height, this shallow trench may be filled in. It is better not to feed more than is absolutely demanded by the state of the plants' vigor, and if the soil has been well prepared, it is best to rely upon it and let the roots strike out for their nourishment. When the flowering period is at its height, and the flower stems appear to be getting shorter, or the color of the blooms becomes not so good (assuming that the weather is all it ought to be in regard to sunshine), then some liquid manure may be given and some fertilizer may be stirred into the soil along the edges of the line.

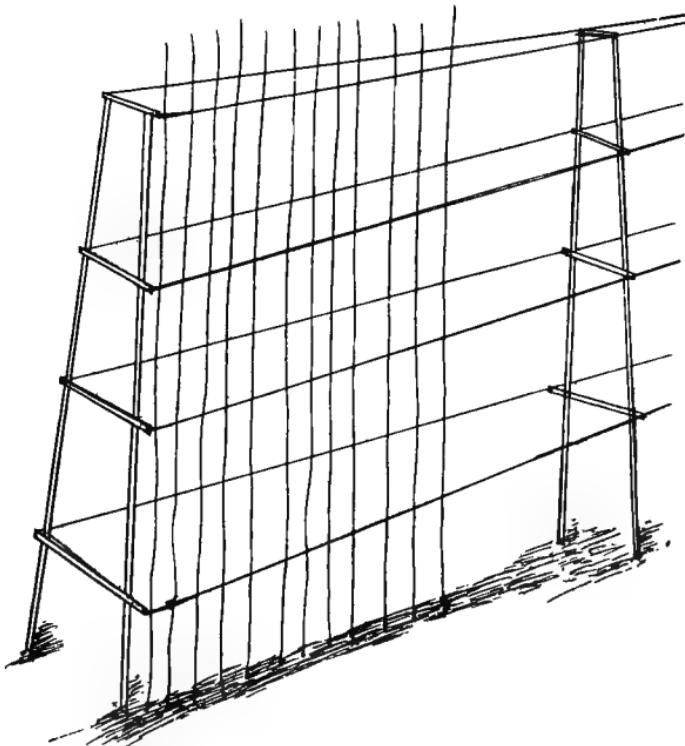
STAKING

As soon as the young plants begin to make headway, and are 3 in. or 4 in. high, some support becomes desirable. Little twiggy branches are best if these can be had locally and cheaply. Indeed, Birch (or similar) branches are made use of, whenever a supply is obtainable nearby, for the permanent support of the vines. Light spreading branches



END VIEW OF SUPPORTS FOR A DOUBLE ROW OF SWEET PEAS

The supports are made of 2-in. quartering, with horizontal struts for carrying the strained wires, to which bamboo canes are tied perpendicularly.



SIDE VIEW OF SUPPORTS FOR DOUBLE ROW OF SWEET PEAS, SHOWING THE BAMBOOS FIXED TO THE WIRES. THE SUPPORTS ARE SET TEN FEET APART

8 ft. tall can be used, and as they will have a heavy weight of stem and leaf and flower growth to carry later on, be sure you insert the stakes very firmly.

Wide meshed wire netting is still better, because it does not obstruct so much light. This is much in favor in many commercial establishments, being clean, neat, handy to fix up, and if the plants should happen to get higher than 8 ft., as many will, an extra belt of netting can easily be run along the top. Stakes or poles 2 or $2\frac{1}{2}$ in. in diameter should be inserted at intervals of 5 ft. apart in the rows for the support of the netting, and, of course, both sides of the row must be furnished with the netting, leaving 6 in. between. The 2 in. mesh, costing about \$5 for a roll of 150 ft. by 6 ft., is the cheapest and is satisfactory.

Thirdly, for Peas in houses, binder string is much employed. This is strung tightly from post to post at intervals of 8 in., and the plants are tied thereto. This is the most usual method of support, being the cheapest. Strained wire "fences" or frames may also be adopted.

Lastly, light bamboo stakes, as thick as one's little finger, and 5 ft. to 8 ft. in height, form an admirable, albeit expensive means of support for plants that are grown on the single stem principle. The stakes cost \$1.25 per 100, or a little over \$10 per 1000.

These canes are practically everlasting and need not be inserted very deeply in the soil, but should be tied to two horizontal, thin, strong laths, one at top and one at bottom, these being nailed to strong upright posts at intervals of 10 ft.; or they can be kept in position by horizontal wires. (See page 63.) Do not use ordinary or uncoated wire if that can be avoided, as it rusts, and may be the cause of setting up a disease or disorder in the stem.



Row of the Summer-flowering Spencer Sweet Pea King White, staked with Beech Branches

Where bamboo stakes are used, the plants will, of course, require more careful attention as to tying and regulating.

WATERING

An abundant supply of water is always one of the first essentials for a grower, not only for watering his plants, but in order that, if necessary, a strong spray may be turned upon the foliage. For this supply, not only for the Sweet Pea crop, but for others on the place, it is well to have a tank or head of water, the force of which should have a pressure of 20 pounds to the square inch. It is not likely that much force will ever be required in the case of Sweet Peas, whose stems are liable to snap, or whose foliage may be torn if the stream is forceful. Whether to sink a well and pump water to the cistern by gasoline engine on one's own account, or simply to pay rates and get the city water—presuming that one lives near a city—is another matter deserving consideration. In any case, sufficient water must be provided, however it is procured, and where several thousand plants are grown, a tank of 1000 gallons will be required. From 1 to $1\frac{1}{2}$ gallons per foot run of Sweet Peas per week, according to the weather and the season, is an amply safe basis on which to estimate the water supply, and so make provision for it. If possible, the water should be chilled, or be made luke warm, but this is not essential. The cost of a two horse-power engine is \$200 or \$250, and this would be complete with pump for either deep or shallow wells, and the cost of running the engine to raise 500 gallons a day would probably not be more on the average than \$1.25 per month.

In regard to water tanks—they can be made of wood, iron or concrete. The latter offer many advantages, among these being that the materials necessary for their

construction are easily procured; the tanks themselves are easy to build, they do not rot, and are practically everlasting. How to make them is explained in bulletin 23, published by the Association of Portland Cement Manufacturers, Philadelphia.

A good rule is to "water with an ascending temperature"; that is to say, in the morning rather than at night or late in the afternoon. It is argued, with some show of reason, that watering at night chills the soil about the roots, giving them "cold feet" until next day, and that, consequently, this is a fertile cause of buds dropping, and also rather encourages mildew. This may be true at times in the case of the outdoor crop, but has but little effect under glass. However, cold and cloudy weather, coming suddenly after watering, demands prompt firing up on the part of the grower, who at the same time should open the ventilators sufficiently to cause the warm, dry air to circulate. It is well to bear in mind that heat and dryness are detrimental to Sweet Peas, and if continuing together for even a day may prove fatal to the plants.

TEMPERATURE

It has been stated already that a temperature of 55 to 60 degrees Fahr. is favored for the germination of the seedlings, but after they are well through the soil gradually reduce this at the rate of one degree per day until the maximum day temperature is 50 deg. Of course, where the house is cleared, it is advisable to start the Peas cool, sowing them directly where they are to grow. In any case, so soon as germination has taken place and growth has well begun, a day and night temperature of 50 and 45 degrees respectively is then maintained until the plants have grown $2\frac{1}{2}$ ft. to 3 ft. high, which will have given

NIGHT TEMPERATURE RECORD

TO BE FILLED IN BY WATCHMAN

Month of

191

House No.

Time	East or West																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
6 P. M.	55																														
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* These Temperature Records, for day or night use, may be obtained from the publishers of this book. They are sold in pads of 100, printed on serviceable paper. Size of sheet, 6½ inches deep by 11 inches wide. Price, 50 cents per pad, postpaid.

them time to send down roots deeply and have promoted a sturdy foundation in the plants themselves. Should flower buds have prematurely appeared up to this time they will, of course, have been removed, together with sub-laterals or side growths, and unnecessary leaf growth and tendrils. But from the time the plants are waist high, more warmth should be given, the temperature being raised to 60 deg. at night with 65 deg. as the average day temperature, up to 70 deg. Fahr. with sunheat. Above this mark the plants are liable to be too much forced and weakly.

The Spencers enjoy a rather higher temperature than the grandifloras do, for they have a more ample bloom to build up, and are more sumptuous altogether in their requirements. A healthy, buoyant, even temperature, with the soft, sweet "growing feeling" about it, between 55 and 60 deg. Fahr., is the ideal. Above all, try to avoid sudden or rapid fluctuations; it will prevent disappointments.

VENTILATING

As regards ventilation, the more nearly perfect the gearing is and the larger the house, the easier it will be to keep the temperature steady. Too much stress cannot be laid upon the need of an even temperature, for sudden drops and rises upset the condition of the plants and are a fertile cause of mildew and of bud dropping. It will test the skill of the grower to regulate his temperature on days of cloud and sunshine, with a keen, cold wind also blowing. Draughts are fatal, yet air may *have* to be given. The best plan on such days is to keep the fires low but clear, with a nice heat in the pipes, ventilate on the leeward side of the house, and rather let the temperature run up to

72 deg. Fahr. than have to take in a direct cold current, however small.

SPRAYING AND FUMIGATING

Each of these operations is as important as any of the others. On all bright days from the time the plants are through the soil, spraying may be done, but as in all else in Sweet Pea culture, wise judgment is necessary. No one would surely spray a line of Peas in full bloom; that is to say, the flowers themselves. These should be kept dry. But from the time the seedlings appear above the soil, dewing and spraying may be done, weather permitting. With the earliest July and August sown crop, a good wetting spray should be given several times a day during hot spells. The surface of the paths or alleys between the rows, also the soil, walls and woodwork must be sprayed, all with the object of lowering the temperature. But while a moist atmosphere is detrimental to red spider, strive above all to prevent anything in the nature of sappy growth. At times this can scarcely be prevented.

In dull, gloomy weather the spraying may be dispensed with, and if the air should become overdry, the sprayer or mistifier must be brought into action. When only a slight dewing over is necessary, the automatic air pressure sprayers are employed and the work can be quickly accomplished.

No insect pest ought to be able to gain a hold. Green aphid, red spider and thrips are the most common and persistent enemies, and the best means of combating these under glass is spraying with Aphine or fumigation with Nico-fume. Twenty sheets of Nico-fume are sufficient for a house 100 ft. long by 30 ft. wide; but directions for the use of these accompany each package or container.



SWEET PEAS GROWN TO A SINGLE STEM AND TIED TO BAMBOOS

Aphine costs \$2.50 a gallon. One fumigation every three or four weeks is enough, and should be done even if no green fly is about, and in order not to burn or harm the tender growths, fumigate when the temperature is not higher than 60 deg. Fahr. Hydrocyanic acid gas is used by some growers but in the case of Sweet Peas it is not to be recommended. It too frequently causes burning and dropping of the buds.

Mildew may be kept in check by dusting with finely powdered sulphur, blown upon them by a Malbec bellows. After a couple of days, syringe it off and when the plants are again quite dry, dust them again, lightly. The hot water pipes must neither be painted with sulphur nor have any sulphur dusted upon them, as the heat causes sulphur fumes to arise which do much damage to the crop and discolor the woodwork. However, the use of sulphur is an evil in itself, inasmuch as it clogs the pores of the leaves. But the mildew has already done that if the attack is a bad one, or will do it if not prevented, and the finely pulverized sulphur prevents it. Careful watering, firing, and ventilation will do more than all else to prevent mildew.

REGULATING THE SHOOTS

An important part of the routine work in Sweet Pea cultivation consists in regulating the shoots, not that this requires an enormous amount of time and attention, but it is a very necessary factor in the production of first-class market blooms. If wire netting is the means of support there will be less need of tying, although it pays to keep the leading shoots fairly straight and well fastened up. Never tie so firmly that the stem is squeezed or bruised, as injuries of this kind, like the injuries that arise from faulty pulling of the flower stems, offer a fine field for fungus spores to



BRANCHING OF THE SUMMER AND WINTER FLOWERING TYPES

The Summer or "garden" type branches freely; the ordinary Winter flowering grandiflora and Telemly types run mainly to a single stem and branch sparsely

seize upon and so set up disease, and in any case decay may set in and ruin what would otherwise be a good flowering shoot. When the Peas have started well into growth, six or eight lateral shoots may forge ahead. These should be thinned out to three (or sometimes to one main stem), and if the side growths are kept removed as these latter appear, it will throw vigor into the stem and lead to the production of finer flowers with long stalks. The illustration of the branching of the garden (or Summer) and the Winter-flowering types shows their character.

FEEDING

It is important, also, in order to maintain length of stem, amplitude of foliage and beauty and size of bloom, to keep the plants well nourished. A very thin, light mulch of pulverized sheep or cow manure is sometimes applied, while other growers rely upon applications of these manures in a liquid state, at the rate of one part diluted with ten of water, every twelve or fourteen days; and this can be *alternated* with superphosphate, one-half ounce dissolved in a gallon of water. Although it is not advisable to be too generous in the use of nitrogenous manures, which tend to cause rank, sappy, leafy growth, still there are times when they are of value, as, for instance, toward the end of the growing season, when the plants require a fresh stimulus. They then may be watered every twelve or fourteen days with sulphate of ammonia, at the rate of half an ounce to each gallon of water. Scotch soot, or soot got from chimneys where soft coal is burned, is likewise an excellent fertilizer, containing some ammonia. It has also a slightly beneficial mechanical effect on the soil, particularly heavy and colder soils. Its effect on the plants is to assist them in the production of growth and

better color. Phosphatic manures, like superphosphate and bone meal, tend to firm-up the stems and throw the plants into flower, and where seed production is a desideratum, reliance can be placed on phosphatic fertilizers. Guano is a quick acting fertilizer, containing a good percentage of soluble phosphate. For digging into the soil in preparation for the crop, basic slag 6 oz. to 8 oz. per sq. yd., is good. It slowly yields phosphate; but it and bone meal need not be used together.

Some of the prepared fertilizers are also good and reliable, and their merits must not be overlooked.

Potash is another of the essential ingredients for a soil for Sweet Peas. Since anthracnose in America, and the "streak" disease in England have been so virulent and destructive, much attention has been directed to the value of potash. It is claimed for it that it braces the energies or system of the plant against diseases. It assists the formation of starch, which is the first material that the leaves elaborate. Its effect, therefore, is to cause a fleshy, thickened, well-balanced growth. Kainit, procurable from wholesale dealers in fertilizers, contains 12 per cent. of potash; while as a usually readily procurable local supply, wood ashes can be used; they contain a fair proportion of carbonate of potash. Heavy soils and clays have the highest proportion of available potash; so much, indeed, that there are good cultivators who never think of supplying potassic manures to them.

Where one has to deal with heavy soils, quicklime should be freely used. It greatly helps to break it up or at least make it less adhesive. On the other hand, it helps to make a loose soil firm, contradictory though it may seem. Quicklime tends to sweeten soils that have become over-rich, like highly fed garden soils; and to correct acidity

in soils that are badly drained. Reclaimed peat lands benefit greatly by liberal applications of quicklime, as do the black, soggy material that is often dredged from the bottom of lakes, rivers, ponds or canals. Such stuff is often rich, and if it is spread out half a foot thick over an unused piece of land, then left over Winter for the frost to act upon it, and is then coated with a good inch or more of quicklime, and mixed, is an excellent top dressing material for shrubs, fruit trees, poor vegetable land, or hardy flower borders, and may be employed, albeit judiciously, for adding to soil for a Sweet Pea crop indoors. Do not risk using such material, however, on any large or important scale, until its qualities (or the opposite) have been proved.

This leads us to remark that one can err as much on the side of generosity as in niggardliness. Many a man has seen his misspent labors come to naught through his having dosed his soil too heavily with this, that, and the other fertilizer, and when his plants assumed a sickly, feeble appearance about the time they ought to come into flower, has wondered why. The reason in some such instances is that the system of the plant is surfeited and the roots are poisoned or physically impaired for further healthy action. Overfeeding, especially with nitrogenous manure, predisposes the plants to disease.

HOEING AND WEEDING

In the early stages of growth the soil about the neck of the plants and along the tops of the rows should be stirred and hoed to keep the soil aerated. It is almost needless to say that weeds should not be allowed to take possession of any part of the soil, nor should pests ever succeed in getting a foothold. Pods ought, of course, never to be allowed to form on Peas for marketable cut flowers. The

whole arcana of good cultivation may be summed up in the following rules by a well-known gardener: "Trench deeply, manure liberally, plant thinly, stake quickly, water early, and dispod promptly."

CROPS TO GROW WITH SWEET PEAS

In most or all cases, a crop or crops can be grown in the same house with the Peas. Among the subjects that are suitable are Asparagus plumosus, Wallflower, Lupines, Myosotis (Forget-me-not), Pansies, Mignonette, Candytuft, Clarkia, Stevia, Schizanthus, Primula malacoides, Primula obconica, and also Dutch bulb stock and later on bedding plants. These can be accommodated on side benches, leaving the middle of the house free for the Peas. Pansy seeds may be sown in August to produce plants for flowering in the greenhouse in Winter, and Clarkia, Candytuft and Schizanthus in the early Autumn. Wallflowers may be grown from seeds sown in July, or from cuttings taken early in the Spring. All of these plants may be grown in a night temperature of about 50 deg. and a day temperature of about 60 deg. to 65 deg. They will produce flowers late in Winter or early in Spring. Set the Pansies 5 in. or 6 in. apart each way, the Wallflower, Clarkia, and Candytuft 8 in., and the Schizanthus 10 in. to 12 in. apart. The Pansies and Candytuft should be grown in benches; the others either in benches or pots.

Violets may be grown between the lines of Peas, but in that case at least 5 ft. apart is necessary. Tomatoes form a fine crop to follow with in Summer, and if the plants receive a good start, much of their crop will be ready before the outdoor fruits are ripe. An average of 7 lbs. per plant can be produced.

CHAPTER V

SWEET PEAS IN THE CHICAGO REGION

The cultivation of Winter-flowering Sweet Peas during the past few years has grown to large proportions in the vicinity of the Chicago wholesale cut flower market. Their cultivation is widely diffused; nearly all the growers produce more or less stock. There are some, of course, who make a specialty of them and have had their greenhouses built so as to conform to the requirements of the crop. There are also some growers who give them pre-eminence above all other stock. There are still some who make a specialty of Chrysanthemums and Sweet Peas and grow nothing else. In that case, the Peas follow the Chrysanthemums in the Fall, and generally last on the benches until the planting season for Chrysanthemums comes around again.

There is a general periodicity in the sowing of Winter-flowering Sweet Pea seed, except among those who make a specialty of them. These usually plant in July, which is necessary to secure a crop to begin blooming by Thanksgiving and continue through the Midwinter months when these flowers bring the highest market price. When the grower is depending on this crop exclusively, he has to have the flowers in bloom when highest prices are paid, to make it profitable. The grower who cultivates them in connection with other crops can afford to take chances on what the crops will bring when he is depending on neither one solely for his returns.



SWEET PEA MRS. ALEXANDER WALLACE
(LAVENDER)

There is a large amount of Sweet Peas planted during late October and November. These plantings usually follow Chrysanthemums, and Peas have been grown with success for this market when sown as soon as the early crops of Chrysanthemums have been cut, so that a good start can be had before the real short days begin. The crop to follow the later Chrysanthemums is usually sown in small pots some weeks in advance so that no time may be lost as soon as the benches become vacant. These plantings make good late Winter and early Spring crops. The first sowings are usually made in July for the earliest Winter crops, and successive sowings follow as the space and the opportunity presents itself to the grower, so that he may have blooms from Thanksgiving to Memorial Day. The Memorial Day trade usually nearly finishes the crops of indoor grown Sweet Peas, and no sowings are made for indoor culture that will come at a later date.

During the past two years the Winter-blooming Spencers have been the favorite varieties grown for this market. They have to a very large extent eclipsed all the others; that is to say, the grandifloras that have been cultivated for so many years. The growers have also originated some varieties of sterling merit in the vicinity of this market that were offered to the trade for the first time in 1914. These were Winter-blooming orchid-flowered Sweet Peas. The merits of these are best known to all who have had regular access to the Chicago wholesale market. The limited stock of these that was offered was all sold at a price equivalent to about six cents per single seed. These same growers have other varieties, the quantity of which is still limited, for which a price many times larger has been offered and refused for the seeds.

The Winter Sweet Pea has now acquired a prominent

place in this market. Following Roses and Carnations, the Sweet Pea is a lively competitor for third place during the Winter season when the best varieties are in. It is displacing Violets and Valley, in many instances, for general use, and for corsage effects it gives both of these old favorites a close run. Each appears to be in the other's way. The Violets sell best when Sweet Peas are scarce, and again the Sweet Pea growers state that before and after the Violet crops are on the market the Peas sell best.

Sweet Peas can be grown in the greenhouses during the Winter months to perfection in any soil that will grow Carnations or Roses well. Some growers prefer a lighter and more friable soil for the Peas than either, but this is a point that each grower decides for himself. The type of houses favored are those of high roofs with good ventilation. The Sweet Peas sometimes get to be of considerable height, and only houses with high roofs will accommodate them. They are generally planted on solid beds in the greenhouses that give them the full opportunity to utilize all space from the beds to the glass.

The Winter of 1913-14 was not a good one for the Sweet Pea growers in this section on account of the dark, cloudy weather that prevailed during the Midwinter months. The Sweet Pea must have sunshine for its best development, and the months of December and January of the past Winter were notably lacking in this respect. This causes the buds to drop, and an unusual shortage of supply was caused during two months of the season when these would have brought the best money. One prominent grower stated that while he had two houses more of Sweet Peas that Winter, his returns were not equal to what he received the year previous with considerably less growing capacity. Another large grower had decided not to plant

any additional because of the poor returns for the past season. With these exceptions, the great bulk of the growers are satisfied with the returns in this particular line of stock, and while one or more may drop out, others will come in, so that the crop will always be fully equal, if not superior, to any in the past.

INDIANA

The cultivation of Winter Sweet Peas is extensive in Indiana, and is widely distributed among many florists. The grower who does not have them to offer is an exception rather than the rule. There is a reason for the alteration of crops in the greenhouses at a time when there is perhaps no other flower which would produce as prolifically in the same length of time. Again, the Sweet Pea is very adaptable in its uses. Nearly every small grower is fortunate in having a quantity on hand when funeral work or counter trade is flourishing.

August is the month in which most Winter Sweet Peas are sown, and are offered in the Indiana market at any time from Thanksgiving to Easter. Many of the more successful Carnation growers are having an abundant crop of Sweet Peas for Easter. It is generally found that no great harm is done by the Sweet Pea vines trailing about the posts in the Carnation houses, and they produce at a time when Carnations are at a low ebb and often almost unavailable.

The varieties are, of course, enumerated under the Spencer types. Mrs. A. A. Skatch, Bridal Veil, Pittet's new Rose Queen, Mrs. Chas. Totty, and the new lavender Anita Wehrman, are the favorites in this community.

It is a self-evident fact that any flower that maintains a prominent position in the flower world for a protracted

period makes itself burdensome among the flower lovers in that it becomes common in being seen at all times and places, at all prices and under any adverse conditions.



CUT BLOOMS OF NEW ORCHID TYPE OF SWEET PEA ROSE QUEEN

The Violet, of course, has its own particular beauty like any other flower maintaining a worthy position among the flower shop's staple articles.

The newer varieties of the Sweet Pea have made their

appearance just lately. Isn't the stem grand! Are not the colorings beautiful, the fragrance all that could be wished for, and don't the color combinations in baskets or corsage bouquets give a sense of novelty and newness not found in the stereotyped bunch of Violets! This does not mean that the Sweet Pea is a finer flower than the Violet: it simply means that we are improving the Sweet Pea all along. We are asking the public to take cognizance of it, and they are supporting the florists liberally.

The writer always did maintain it does not do for a grower to place too much stress on one particular flower for too great a length of time, unless there is a great market which will appreciate it. The rules laid down by prominent growers, such as Messrs. Sim and Zvolanek, are closely followed by growers in this vicinity. They are given all the attention that is detailed by the larger growers, and the houses are just as large as may be afforded.

IN THE PHILADELPHIA SECTION

In Philadelphia and vicinity the growing of Winter Sweet Peas is somewhat widely diffused, there being no really large growers, in the modern sense of the word, who specialize on them. A well known firm at Brandywine Summit, Pa., some 30 or 40 miles from Philadelphia, specializes on a very large scale, and has the reputation of growing the finest quality.

There is a continuous supply of Sweet Peas in the markets of this city and this is maintained by sowings made from time to time. The new Winter-flowering Spencers are very greatly in favor, so much so, in fact, that the old grandiflora types are almost unsalable. It is to be expected that only the newer types will be grown soon. It is almost impossible to name the favorite varieties, as they are all

given a trial; novelties are tested, and it will, in all probability, take another year or two before the best of these in their respective colors will be known.

The Sweet Pea is a favorite flower in the Philadelphia market, and has apparently displaced the Violet to a great extent; indeed, in the late Winter of 1914 there was scarcely any call for Violets here—they seemed to have lost favor.



SWEET PEA KING WHITE, ONE OF THE BEST OF THE SUMMER-FLOWERING SPENCERS

Most of the growers in this section plant in solid beds and in rows varying in width up to 3 ft., in houses with plenty of head room.

IN PENNSYLVANIA

Usually, the first sowing is made about the middle of August with us, although some growers sow earlier. August

is a very troublesome time to sow Peas, as the intense heat we often experience then is entirely adverse to the conditions under which the plants thrive.

We often have trouble with the tender vines dampening off at the ground; in fact, on more than one occasion they damped to the extent of 50 ft. to 100 ft. of row. We have tried different methods to prevent this trouble—have used lime in the soil at planting time, sterilized with formaldehyde, and tried keeping the soil both wet and dry, and have come to the conclusion that a partial preventive is a well dampened soil at sowing time, and care in keeping conditions as uniform as possible.

We have with us a disease called "black root," which seems to be the most troublesome during extremely hot weather. The writer has on several occasions sown an entire house which became affected with this disease. It is noticeable soon after the vines appear above the surface by their stunted, yellowish appearance. The roots, on examination, are found to be black for several inches of their length below the surface of the soil; also, many of the rootlets are entirely rotted off. If one has patience, with the coming of cooler weather many of these vines will send out new roots and make a fair growth of vine, but never as good as those not affected.

Make a furrow beside the diseased rows and sow a fresh supply of seed; this generally gives good results, as the second sowing, while in the same soil, is naturally made considerably later in the season. On one occasion, owing to a fear of again having this disease to contend with, we planted another crop in the house and delayed sowing Peas until the beginning of October, and had little or no trouble from the disease, which goes to prove that it is a hot weather disease. Peas for Midwinter blooming were sown in

August at a new location remote from the older houses, where we could find no trace of this trouble. Possibly, by using movable greenhouses we could travel ahead of it.

The "green worm" never caused us much trouble until 1912, when it seemed to come in droves. Poisoning was tried with different compounds, but very few worms seemed to be killed by this means, and we had to resort to hand picking.

Bud dropping is caused by too sudden changes from long continued warm weather to dark, cloudy weather, or the reverse, or from too high an artificial temperature, followed by a sudden drop.

As to temperature—during Midwinter we run a night temperature of 50 deg.; during cloudy weather 55 deg., and 60 to 65 deg. during bright, clear weather. Toward Spring we drop to 45 to 47 deg. at night and the same day temperature as during Midwinter.

Sweet Peas require constant attention after the vines are tall enough for support, to see that they are kept growing erect; in fact, from that time on during the blooming period more labor is required than for any other greenhouse crop, that is, if you wish to handle the stock carefully and for profit.

NEW YORK AND EASTERN STATES

As it was from New York and New Jersey that the first early flowering Peas were heard of, and as Winter Sweet Peas have been sold in New York and Eastern markets for upward of 20 years, it will be understood that in the intervening period the development in the flower and its culture have been as noticeable here as in any other section. Probably more Sweet Peas are grown in the region under note than in any other. Zvolanek, Sim, Schuneman, Harvey, Barker, Morgan and many others

SPENCER TYPE OF SWEET PEA

GRANDIFLORA TYPE OF SWEET PEA

Note the bold, erect standard of the Grandiflora, and the waved standard of the other. The tendency is to produce much more waved and frilled Spencers, as shown on page 91.



have been instrumental in spreading a love for, and better knowledge of, this desirable flower. For years large houses have been added, and new growers have taken their place in the ranks.

Remarks on William Sim's system of culture appear in our general treatise, and it should be stated that he also grows Violets in the same house. The Sweet Peas are grown in solid beds 5 ft. apart, in cool, high, airy houses, in rich soil. This distance leaves room for three rows of Violets at a foot or more apart between the Peas. The latter are grown lengthwise of the house, and on the north side of the rows, where too much shade would be cast on the Violets, a space is left, and one row of Violets is taken close up to the base of the Peas on the sunny side.

There are also many growers in Long Island, New Jersey, Connecticut, Rhode Island and Massachusetts; while in New Hampshire and Maine the Summer crop is much in evidence. So far, the newer varieties have not been so much employed owing to the cost of the seed, but the leading growers are investing in the more expensive kinds. The best cultivators recognize the fact that the rows must be wide apart, and for the older varieties at least, the plants must be grown on the cool side to get the finest results over the longest period.

This is a crop well suited to the man who does most of his own work, and there are many who grow on contract for a wholesale house or large retailer. The soil in many cases is worked with a small hand cultivator. It is found that the medium grade of blooms frequently sells well because they are so useful; even more so in certain cases than the flowers with stems 18 in. long. The blooms with stems 12 in. to 14 in. in length usually find a ready market in the lesser cities.

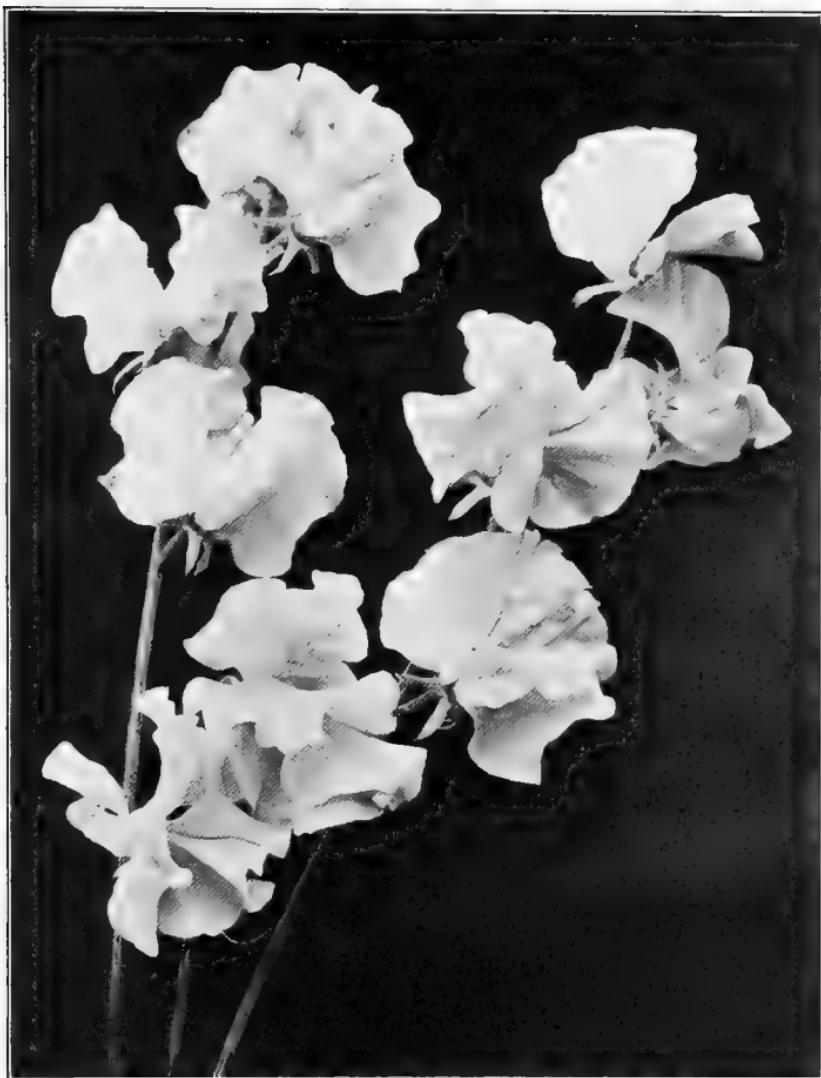
TENNESSEE

It cannot be said that there are many Sweet Pea growers in this State, and, indeed, the only one to cultivate a surplus has been Addison J. McNutt, who has been able to ship blooms to the Kansas City and Cincinnati markets. This grower is now testing the Orchid or Spencer varieties for the first time and is devoting a house 120 ft. by 20 ft. to them.

The earliest sowing is made about August 15th, which is found, all things considered, to be an excellent period. Christmas Pink and similar free-flowering, sturdy varieties have hitherto been employed almost exclusively. Of course, plenty of head room has been given, and plants of good height and flowering over a period of many weeks have resulted. The rows are usually planted the length of the house, running north and south, these being 3 ft. to 4 ft. apart, and the plants 3 in. from one another in the row.

Hitherto the Sweet Pea crop has not been thought of so carefully as to necessitate the keeping of exact records of the yield, but there is a feeling among the growers that since the finer varieties are being offered it will be necessary to do this, just as it has in the case of Carnations, so that the least worthy kinds can be discarded and be replaced by others that prove good.

The ruling price for the older varieties, such as the Christmas Pink, is \$1 a hundred during December and January, the price falling to 50c. a hundred in February, March and April. It is found that the main cost of production is in preparing the beds. These are turned $2\frac{1}{2}$ ft. deep and 6 in. of rotted manure is placed in the bottom, and about 3 in. of similar material worked on the top. It also pays to use about 4 lbs. of muriate of potash to 100 sq. ft. of ground bed.



NEW SO-CALLED DOUBLE SPENCER FORM OF THE ORANGE-PINK
VARIETY MAGGIE STARK, A SUMMER BLOOMER

TEXAS

Not a great many of the florists in Texas grow Winter Sweet Peas, although a few cultivate them extensively. On the other hand, almost every one who pretends to grow flowers at all grows Peas in the Spring and Summer. The seeds are generally sown so as to furnish a succession of flowers. There are several varieties which have proved very satisfactory, notably Snowbird, Christmas Pink, and a Lavender of that type. The Winter-flowering Spencers have been tried with rather poor results. In our list of cut flower quotations we give place to Carnations, Roses and Sweet Peas in this order. The Sweet Pea is easily third in favor with us at all times, and during April and May it contests with Carnations closely for first place. Growers here consider the Sweet Pea much in advance of the Violet.

SWEET PEAS IN CANADA

In the eastern part of the great sister Dominion, and in the Toronto region in particular, Sweet Pea culture in greenhouses has far better results than outdoor cultivation. Sweet Pea culture under glass is practiced far and wide and with success. The matter of temperature, soil, and treatment in general, is under the command of the grower, which is a great gain in this northern climate. The usual Winter bloomers are grown here, and the new sorts with fancy prices are being tested in a mild way.

It is found that soil that has grown some crop already is by no means good enough for Sweet Peas. Turf is best, just chopped up roughly, with some bonemeal through it; let the turf trench be deep and 12 in. wide at least. In private establishments sometimes a bed is made on each side of the greenhouse and plants are trained up each side of the glass without interfering too much with the growth of the

other material on the benches, such as Cyclamens, Primulas, Lorraine Begonias and other Winter-flowering stock. The dwarf sorts for Christmas flowering are sown 2 in. apart in the row, also the taller kinds, if there is abundant head room. They are the most productive.



VASE OF SWEET PEA CHRISTMAS PINK

The middle of September is the date for sowing for Christmas blooms, and a night temperature of 55 deg. Fahr. all Winter is maintained. To raise it higher often means hard firing. Plenty of water is given when growth is going well. Use stout twine and stretch it along as you

would outdoors. Look after the supports, as keeping the stems straight and tidy counts much in the long run.

When flowering commences, constant picking and judicious feeding are required. Albert's concentrated manure is good, also liquid cow manure.

For an Easter crop sow the taller varieties about the last week in December. The photograph on page 43 shows the Spencer types 7 ft. high, with four stout flowers on stems 15 in. long—really magnificent blooms. These flowered continuously from April to the end of June. During these months water was supplied unsparingly, and thousands of blooms were cut from a short row. Either in small houses (15 x 100 ft.), or in the mammoth houses of some Americans, Sweet Peas are truly a profitable crop for the private or commercial grower. Do not treat them as a secondary consideration; give them the best attention; give them what you know is a fair trial.



CHAPTER VI

VARIETIES*

The matter of varieties deserves close attention. We want free-flowering, vigorous, healthy kinds. What each man's special market calls for, especially as regards color, is for him to discover. There are also seasonal demands for special colors: in New York, for example, whites and lavenders give way to the brighter colors, such as reds and pinks, at Christmas. As a rule, good rose pink Peas, also pure white and the lavender colors, are general favorites in all sections. When we can offer a Winter Spencer of the color of the new Robert Sydenham variety, which is a Summer bloomer, one ventures to think the fortunate first owner will make money by it. The color of this is a clear, translucent, orange coral. Such a color would be very rich and effective for a table decoration, unless the color alters under artificial light. In any case, the raisers will likely enough in time add these colors to the prevailing list of today. The coming of Zvolanek's Apricot Orchid has brought us appreciably nearer.

The new pink Yarrawa is at present much in demand, not only because of its delightful soft rose color, but also because of its distinct vigor and the lengthy period during which it throws up its long-stemmed, much-waved or fluted flowers. It is unfortunate that so much of the Californian seed stock of this variety should have been lost in the first year of its introduction. Anita Wehrman, clear lavender; and Pittet's Rose Queen, a very free and early pink, are also in the front rank of novelties.

* In this book the term "Winter-flowering" is synonymous with "early-flowering." This strain of Sweet Pea can also be employed for Summer-flowering, but the varieties do not last so long then as the recognized Summer-flowering types.

The Winter bloomers that are at present most widely grown are, of course, Anton Zvolanek's "Orchid-flowered" varieties, the terms "Orchid-flowered" and "Butterfly-flowered" being practically synonymous with the Spencer type. The beautiful Countess Spencer first appeared in 1901 in England, and the prettily waved Gladys Unwin, introduced by W. J. Unwin, was shown in 1904. Since then the present race of Zvolanek's "Orchid-flowered" Winter-flowering varieties have all come into being. The reader is referred to the chapter on the "History of the Winter Sweet Peas" for other particulars in this connection.

Of the novelties of the Orchid type that were offered in 1913, those bearing the plain color name, as White, Red, Lavender and Pink and White were mostly in evidence. As in the case of the new Yarrawa, however, the seed crop of some of them in 1914 proved to be very limited, largely owing to the destruction wrought by aphides. These Orchid-flowered White, Red, Lavender, etc., were splendidly exhibited at New York Flower Show in March, 1914, and sold well in the various markets. They all grow tall. Bridal Veil is one of the best new whites.

Of the new double varieties it is too early yet to speak: possibly by and by they will be so improved and come so true that they will be a reliable commercial commodity. They ought to be tested wherever possible.

The great favorites hitherto have been the improved grandifloras, quantities of which are still grown annually. They have many merits; they come rapidly into bloom and yield an abundance of very useful sprays. Those in most demand are, in *white*: Florence Denzer; in *pink*: Christmas Pink, Mrs. W. Sim and Mrs. W. W. Smalley; in *lavender*: Mrs. Alexander Wallace, Wallacea. Boddington's Christmas White and Snowbird are also in very considerable

demand. Flamingo, as a scarlet, has also come into favor. Others that are of much merit include Christmas Stella Morse, cream and pink; Le Marquis, a pretty rose violet; Mrs. A. Farenwald, early, large, dark pink; Mrs. F. J. Dolansky, soft pink; Mrs. Zvolanek, variegated blue; Watchung, pure white, and Wm. J. Stewart, blue. Mrs. Chas. Totty, sky blue; and Mrs. A. A. Skatch, light pink, are also in favor.

In America we do not hear much about the Télemly varieties, though they are very meritorious. References to them appear in Chapter XI.

In the list of Summer bloomers, those that have proved good are:

America Spencer. Flaked red and white.

Blanche Ferry. Light pink.

Blue Jacket. Blue.

Charles Foster. Rosy lavender.

Clara Curtis. Primrose.

Countess Spencer. Pink.

Dobbie's Cream. Rich cream.

Dorothy Tennant. Lavender.

Elfrida Pearson. Pink.

George Herbert. Carmine.

Helen Lewis. Orange red.

Illuminator. Ruby red.

Inspector. Brilliant orange.

John Ingman. Cerise.

King White. White.

Lady Evelyn Eyre. Soft blush.

Loyalty. Flaked blue and white.

Mrs. C. W. Breadmore. Blush cream.

Mrs. Cuthbertson. White and pink bicolor.

Nubian. Chocolate maroon.

Orchid. Lavender.
Primrose Beauty. Primrose.
Prince George. Rosy lavender.
Salmon Spencer. Salmon.
Vermilion Brilliant. Crimson.
Wedgewood. Light blue.

The following varieties were included in the class of 25 distinct kinds that won the Boddington Cup as first prize at the annual exhibition of the American Sweet Pea Society on June 27, 1914: Elfrida Pearson, Lady Evelyn Eyre, Charles Foster, Empress Eugenie, Martha Washington, Mrs. C. W. Breadmore, Prince George, Nubian, Queen of Norway, Dorothy Tennant, Wedgewood, Hercules, Mrs. Cuthbertson, Blue Jacket, Clara Curtis, Maud Holmes, Helen Lewis, Loyalty, King White, Rosabelle, Etta Dyke, America, Thos. Stevenson, Orchid and John Ingman.

Among the best favored Sweet Peas at the exhibition of the British National Sweet Pea Society in 1914 were these: Dobbie's Cream, Seamew, Barbara, Orchid, Blue Picotee, King White, Thomas Stevenson, Maud Holmes, Elfrida Pearson, Afterglow, Margaret Atlee, Mrs. Heslington, Queen of Norway, Alfred Watkins, Red Star, Agricola, R. F. Felton, Edrom Beauty, King Manoel, Lavender George Herbert, Mrs. Cuthbertson, Princess Victoria, New Marquis, Sunproof Crimson, Illuminator, and Mark's Tey. One of the great Peas for 1915 will be Robert Sydenham, which, if it reproduces the wonderful clear yet deep salmon orange color it had when first seen in 1913, will certainly be wanted by every grower. Frilled Pink, Margaret Atlee and Maggie Stark are each good.

CHAPTER VII

PICKING AND PACKING FOR MARKET

One cannot always choose the best time to pick the blooms, as circumstances govern cases. The sprays ought to be picked when the top bloom of the spike is less than half open. Some growers advise cutting as the sun goes down, while others cut the first thing in the morning. This, as we have said, depends upon the time of shipment, distance from market, and other circumstances. In any case, after the blooms are picked, place them from two to two and one-half or three hours in water, so that they may have a good drink. Pots of $8\frac{1}{2}$ in. in diameter and 8 in. deep, with the hole cemented up, are as useful as anything else, and this allows of the spikes being placed a proper depth in the water, that is to say, about 7 in. of their length.

There is art in gathering the blooms, and the art should be learned. They ought not to be cut with either scissors or a knife, but by a sharp, quick, upward pull the whole stem comes away from the axil of the leaf in which it grows; or the picker can seize the stalk quite at the base, and with a sharp side movement and upward pull, done quickly, take it clean away. In any case, no jagged, wounded or protruding piece of the stem should be left, as in either or any case decay might set up and harm the vines. It is well, after the picking, to cut the ends of the stems slantingly, and place them in water directly they are cut. A light, cool packing room is best

suited for the Peas when they are in water. A little air circulating among them will not hurt them in the least.

Many of the flowers will improve a great deal after being cut, the blooms enlarging quite perceptibly. Blue varieties gain in quality up to about 12 hours after cutting. From that the color declines in brilliancy. Scarlet, pink and orange varieties retain their fine color for a good while, but are apt to take on a magenta tint if allowed to remain too long in the water after being cut. Two hours is sufficient for them. Should the flowers be damp or wet—and this, of course, refers to blooms from the open air—it is advisable to place them in a house where a warm current of air may pass over and among them, because it is essential that before packing and shipping the blooms be quite dry. The warm air will do this and will not in the least detract from the value of the blooms.

The boxes in which the blooms are packed vary in size, some being 10 in. by 2 ft. long, and 4 in. deep; others 20 in. long, 12 in. wide and 5 in. deep; while boxes even larger still are used for the ordinary crop and for the Summer flowers (see illustrations). In the former, 24 bunches of 19 spikes of Peas are packed. In the latter, 30 to 36 bunches. In the case of the shorter stemmed grades these are often bunched in twenty-fives, and are packed in an upright position. An illustration of this method is given. The boxes are of light but strong corrugated paper.

Of course, according to the season, or the condition of the weather, so will there be a need for heavy or light packing. In frosty weather, *every precaution must be exercised*. It is worse than useless, because it is money thrown away, to send out a box the contents of which are sure to get frozen. See, therefore, that sufficient packing material is put around to insure safe transit of the flowers. News-

SWEET PEAS PACKED FOR MARKET

The box shown here is of stout corrugated paper, and is 16 in. wide by 42 in. long by 8 in. deep. The bunches contain 25 sprays each, and are sold in "packages" of a gross. The above are Summer Peas from the open air, as sent to New York market.



papers may be used as the outer lining, and blue or white tissue paper next to the wax paper upon which the flowers are laid in close rows; one row one way until the box is half filled, the other rows in the opposite direction.

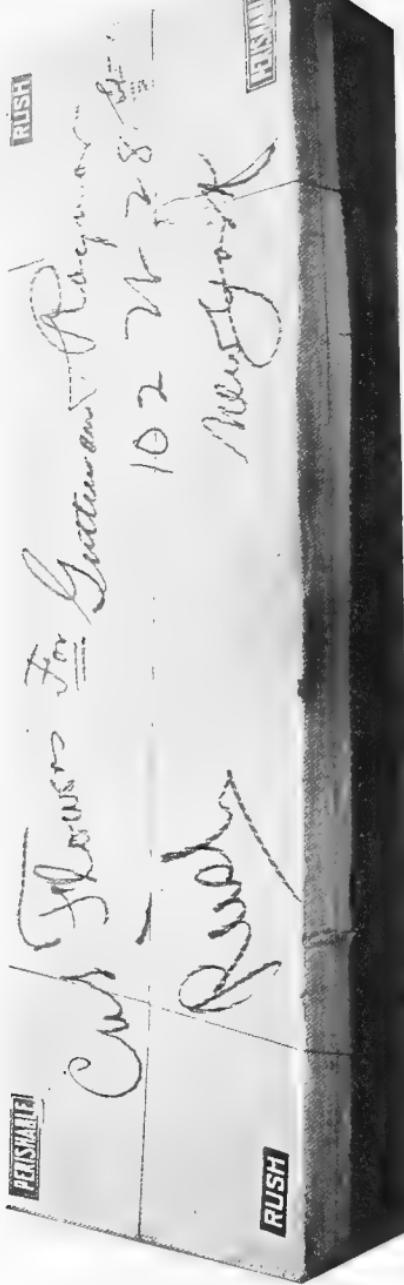
Pack fairly tight, so that the blooms cannot move about, and remember that large Spencers are easily bruised. When the flowers have to travel several hundred miles, or remain packed from fourteen to twenty hours, especially in dry or warm weather, it is well to place a narrow strip of damp cotton across the base of the stem of each flower. Some varieties travel better than others, and for long distance shipping these are invaluable and have to be discovered. Layers of wax paper must be put between each stratum of flowers.

John C. Grace, president of the Retail Florists' Association of Philadelphia, writes in regard to packing and shipping as follows:

"First, in bunching the flowers, arrange 25 in a flat or three quarter bunch: this will protect the flowers from bruising and be a help in packing them. Use a flat box that will hold one or two layers of bunches; place a roll of newspaper in the box so the bunches will rest in a partly upright position; wrap each bunch of Sweet Peas in wax paper, and after each row of bunches place a roll of newspaper till the box is filled. I believe this method would keep them from bruising and also from overheating in warm weather. I have often seen large boxes and baskets of Sweet Peas arriving at the commission houses in a useless condition, owing to the large number of bunches therein, and the warm weather. One advantage of the half or three-quarter bunch is that it makes a much larger showing for the money, and the flowers would not bruise. I believe this method is worth a trial."

PERISHABLE

RUSH



LARGE Box of Stout Corrugated Paper Containing Ordinary Summer Sweet Peas, PACKED AND
READY FOR SHIPMENT BY EXPRESS

An account of the daily cut of blooms should be kept, also of the ruling wholesale price per 100, which may be called the office tally, which will be a check to the commission agents' vouchers or receipts. If the cut from special varieties is to be tabulated apart, together with the prices received, columns can be left blank for them.

Date	No. of sprays cut	Ruling Wholesale price per 100	Remarks
Feb. 29.....	1700	\$1.00	Cold, dull. Spencers very fine.
March 1.....	1400	1.00	Clear, frosty. Fumigated.
March 2.....	1000	1.00	Clear, frosty.
March 3.....	1278	1.25	Clear, frosty.
March 4.....	1522	1.25	Clear, frosty. 12 above zero.
March 5.....	1325	1.50	Clear, frosty.
March 6.....	1875	1.50	Cold, dull. Easter cut in 3 weeks.
Weekly cut and average price.....	10,100	1.06 1/4	
March 7.....	1025	1.50	Snow.
March 8.....	1100	1.50	Dull.
March 9.....	1475	1.00	Clear and mild. Fertilized.
March 10.....	1400	1.00	Clear and mild.
March 11.....	1282	.75	Clear and mild.
Weekly cut and average price.....	6242	1.15	

In regard to the disposal of the crop, unless one can retail in a store of one's own, or can supply a number of retail stores, the simplest plan is to send to the wholesale market. The wholesale commission charges are usually 15 per cent., and a reliable commission house would be likely to handle the product to better advantage than for one to attempt dealing direct with the stores, the commission man being better posted on the subject of credits.

CHAPTER VIII

RAISING NEW VARIETIES

Almost everyone who becomes thoroughly enthused in the cultivation of a floral subject has a desire to raise a new variety, and the Sweet Pea growers are no exception to the rule. This flower, however, offers certain difficulties that simple flowers like a Primrose or Poppy do not. For instance, what are called the essential organs, which comprise the anthers and stigma, or male and female parts, are encased in a fluted petal arrangement, which comprises the keel, on either side of which are the wings, and above, the standard. The pollen of the anthers, which is the male fertilizing element, is ripe some days prior to the stigma being in a receptive condition, so in making a cross the anthers must be removed early from the flower (or two flowers, the others being taken away) that is to become the seed bearer, so as to preclude all possibility of pollination by its own pollen. This is simple enough, but at the same time requires skillful and careful handling. At an early stage in its development, while the flower is halfway in the bud state, before the pollen can possibly have become fully developed, slit the keel along the bottom with a needle, and with the fingers, or with small scissors, remove the anthers and let back the keel. When the pollen from the other flower that has been chosen for the cross is seen to be dry and powdery, and therefore ripe, take it off by means of a very soft brush, such as a camel's hair brush, and apply it to the viscid surface of the stigma, after which a label recording the names of the varieties of the cross should

be attached, and a muslin bag tied over the flower. Some cross-breeders do not think the muslin bag is necessary; but we prefer it. In a day or two the flower will have withered and the seed pod begins to swell rapidly. The seeds must, of course, be kept well under supervision, never be allowed to get mixed, must be harvested when properly ripened, and be sown in due course.

Many folks imagine, or used to, in the old days, that the direct seedlings furnish a brand new true variety from which a stock of seed could be worked up. But the first year's seedlings count for nothing, for the flowers may be like one of the parents or totally different. Assuming that six seeds were saved, the crop from each plant must be saved separately, even though the flowers on each may appear exactly alike. The following year there will be a general mixture. Many may be similar to one or the other of the parents, whilst the rest may or may not be distinct and good. Assuming that there are several promising seedlings, the seed from each must again be saved separately.

On this second generation, generally termed F₂, the raiser must be very careful to keep each plant separate, for some of them are "dominants" and others "recessives," which terms are explained later in this chapter. Both may appear alike, but whereas the recessives will breed true, the others will come mixed in the third year and continue to do so over a period of years.

Until Mendel's theories were understood, raisers were in the habit of putting all seed saved from plants whose flowers were apparently the same, together; consequently, it took many years to rogue down the stock. Certain crosses will not produce a fixable variety. The beautiful rose colored Audrey Crier and its near contemporaries, Miriam Beaver and Syeira Lee, cannot be fixed.

Having saved seed from the selected seedlings, each plant separate, the raiser will, in the third year, discover which are dominants and which are recessives. Those that come true in the third year will remain so; the others are not worth keeping unless of distinct color, in which case a few separate cultures may be grown on.

The main point is to keep the seed of every plant separate until fixity is assured.

Of course, there is much of technical interest in Sweet Pea breeding, and to grasp the subject fully one should study one or more of the books devoted to breeding on Mendelian principles. The average person can, however, succeed if the above outlined details are followed, providing, of course, that time and space are available. One need hardly state that when several thousands of single plant cultures have to be tabulated the work is by no means light. Unfixed stocks of varieties in commerce can be thoroughly fixed by the adoption of the single plant culture system, if the grower knows the varieties thoroughly, and it would be well for all concerned if seed growers generally set about improving their stocks by this means, and thus relieve us of the bad mixtures that even now are all too prevalent.

The symbols employed by breeders to denote the generations of their seedlings are F_1 and F_2 ; usually the third generation is referred to in words. F stands for filia, a daughter, and the numbers simply denote first or second. The symbol is handy and universally understood among those engaged in the work. The term "dominant" means that a certain characteristic or group of characters always assert themselves. Mendel found, for instance, that smoothness as a character of the seed was dominant over wrinkleness, also that yellow was dominant over green.

And, *ipso facto*, wrinkledness and green are recessive, and when a group of recessive characters are combined in one plant that plant breeds true; it cannot do otherwise.

The pursuance of this matter opens up the subject of gametic coupling and other fine facts of embryology. The gamete is "a unisexual protoplasmic body, incapable of giving rise to another individual until after conjugation with another gamete, the joint production being a zygote." The latter is therefore the body or germ, produced by fertilization, and this tiny protoplasmic mass in the ovule carries in it certain of the characters of the parents.

The Sweet Pea raiser must exercise great discrimination and have abundance of patience. He must select the most likely parents, for haphazard crossing rarely produces anything meritorious. He must never cross two weak varieties, and he must avoid as much as possible those varieties that have certain failings, for such failings are invariably dominant in the offspring.



CHAPTER IX

CULTIVATION IN THE OPEN AIR

The cultivation of Sweet Peas in the open ground out of doors is simpler than in the case of the indoor crop. The fundamental principles are similar: the ground should be as well prepared and as liberally treated; the seeding ought to be as carefully done or the planting, if seedling plants are put out; while the staking, tying and keeping the plants clean and free of insects, and dewing them and watering them in dry weather is equally important and does not differ materially from the same practices applied under glass. As a rule, the outdoor crop, though profitable, does not get all the care its value deserves, and there is no reason why this should be.

Sowing in Autumn is not very frequently undertaken, but it can be done. Sow the seeds almost level with the surface of the ground at about 2 in. apart, and when they have appeared, draw up the soil on either side of the row to prevent water from collecting or standing around the neck of the plants, and so cause them to damp. For Winter grown outdoor Peas the soil must be specially well drained.

After the first sharp frost has occurred, a mulch of light, strawy manure is placed over the row, and the plants are not again exposed to light until Spring begins to open up. With the return of the warmer weather the plants should then be examined and the mulch removed, but it should be kept near at hand, or between the rows, so as to be strewn over the plants if necessary. It is doubtful if

Autumn sowing is worth the trouble in this country, except perhaps, of course, south of Philadelphia: there is frequently a large mortality owing to the frost or the rains. However, even if a very little growth appears, growth will, most likely, start strongly, and the plants will certainly be considerably superior to those sown in the Spring because the roots get down deeper and supply sap and nourishment even in the hot spells in the flowering season. Such sowings are made in September or early in October.

Growers who desire plants for the June and July exhibitions start their seeds in heat indoors in March and, when germinated, take the pots to a cool house or frame and grow the plants along slowly and sturdily. The seeds ought to be sown in 3 in. pots, three or four in a pot in soil similar to that mentioned on page 59, the pots being placed in a house with a temperature of between 50 to 60 deg. Fahr., and when the seeds have germinated, and are through the soil, either lower the temperature to 45 deg., or remove the plants to a house of that temperature. Later, when they have grown to 3 in. in height, they should be potted into 5 in. pots and have a few twigs placed around the edges of the pots for support. Then transfer them to a coldframe, where they may remain on an ash bottom, grown as cool as possible until they are planted out about the middle of April, sooner or later, according to the weather. The coldframe should have the protection of double sashes or an overhead covering to the frames in very severe weather, but only then. Allow them as much air and light as possible without subjecting them to alternating thawings and freezings. This is what does harm, and causes mortality. The Pea is a hardy annual, a fact that growers should never forget.

There is no gain, however, in planting too early, and



EXHIBITION SWEET PEAS, GROWN IN THE OPEN AIR, ON EACH SIDE OF A GRASS PATH, AS SINGLE STEMMED PLANTS AND JUST BEGINNING TO FLOWER

it is better to wait until the soil has become nicely warmed, or at all events perfectly free from frost before planting out the young seedlings. At the same time, avoid getting the plants stunted by confinement in the pots.

The soil, of course, must have been thoroughly prepared during the Autumn and Winter, being enriched in the same way as suggested for the indoor crop, and in planting take the utmost care to see that the long roots are not in any way doubled up, but either let them go straight down or spread them slantingly in the hole that is made. The soil must, of course, be moist and crumpling, but not at all wet, and should be well firmed. Immediately after planting all the plants should be watered in.

Staking, tying, spraying, hoeing the soil, and keeping the plants clean will occupy attention during the growing season, while good supplies of water, and later, when the plants are flowering, supplies of liquid manure, should be given. It is advisable in watering, to do so on an ascending temperature, that is to say, usually early in the morning, rather than late in the afternoon, or in the evening.

One thing of importance is that the stakes must be firmly fixed, and branches are perhaps as good as anything for supports, unless, of course, exhibition blooms are wanted, and in that case, if first prizes are expected in a keen competition, the single stem system may be adopted. This, however, is neither necessary nor desirable where average good blooms are wanted for growing decoration or for cut flowers for the house.

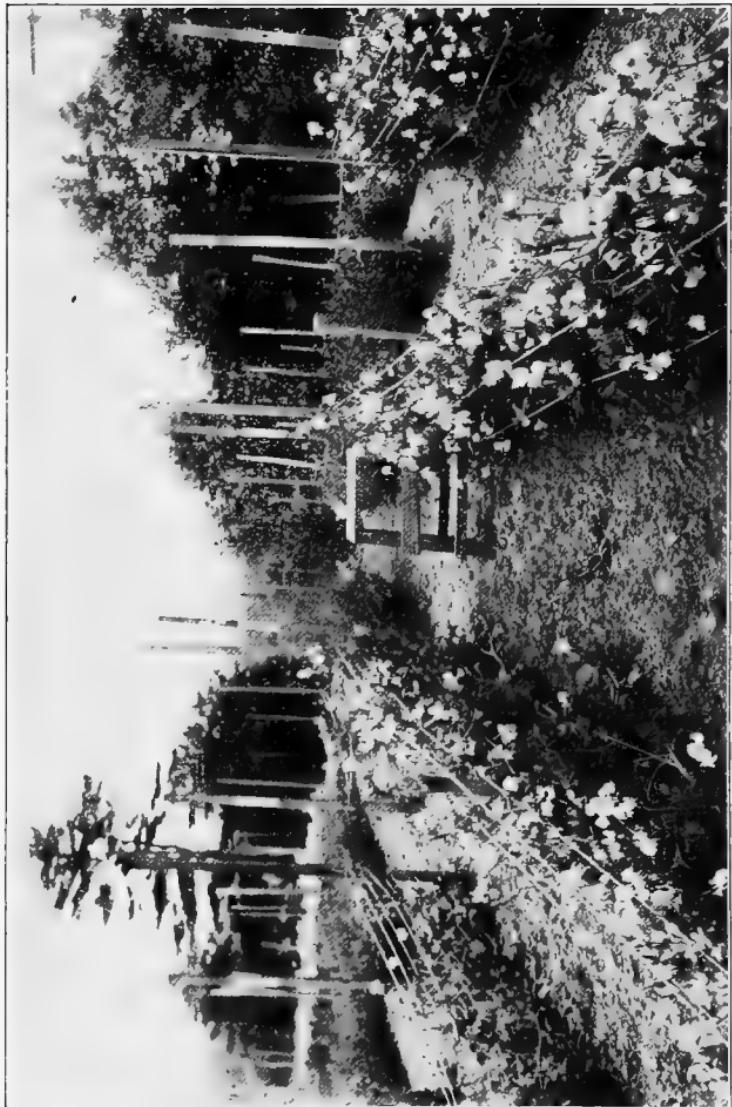
It should have been stated that after germination it would be well to save only two of the strongest out of the three or four seedlings in the pot, and to separate them gently, so that they will stand 4 in. to 6 in. apart in a row, and the rows may be from 3 ft. to 5 ft. apart, a shallow

trench being made. Dusting for mildew is sometimes necessary out of doors, and forceful syringing may have to be practiced to clear the plants of green fly. However, by careful and assiduous attention all the time, no green fly ought ever to gain a foothold. Stirring the soil along the rows with a hoe is necessary, and a light mulch of decomposed manure helps to retain the moisture and affords nutriment when rains come. Where the sun scorches the blooms a line of shading material can be rigged up as already suggested for the Peas under glass.

Where the seeds are planted or sown directly in the soil, a good method is to place three seeds triangularly an inch and a half apart in little hillocks in a trench that is a couple of inches deep. These hillocks are made at intervals of 6 in., and the seeds are put 2 in. deep and the soil made moderately firm. At least one of the seedlings, if all of them germinate, must be removed and a couple of shoots or vines be trained up. Excellent Peas will be got from these.

The great majority of growers, however, still sow their seed in a furrow that is taken out with a spade or a draw hoe, the latter generally. Such furrow may be 8 in. wide. The seeds are strewn along so as to fall at intervals of 2 in. to 3 in. apart all over, and are covered 2 in. deep and moderately firmed, the *surface*, however, being left loose. This is done by drawing a small rake very lightly along the row. In times past, Sweet Peas were sown too thickly, but the varieties then did not grow so tall as those today; most likely it was because they had not the chance.

For mulching in Summer lawn mowings are sometimes used, but there is no nourishment in these, though they conserve the moisture. Occasionally they become closely matted, in which case they must be stirred up.



VIEW OF PART OF THE SWEET PEA TRIALS AT CORNELL UNIVERSITY, ITHACA, N. Y., FOR
THE A. S. P. S. THE DEPARTMENT OF FLORICULTURE THERE CONDUCTS THESE. THEY
ARE UNDER THE CHARGE OF PROF. A. C. BEAL, AND HAVE NUMBERED
AS MANY AS 400 ROWS, TOTALLING 1½ MILES

Until recent times the commercial grower in England was content to grow Sweet Peas as he did other things, that is to say, he produced the best he could without any special pains being taken. The best growers naturally obtained a superior grade of bloom, but in such cases it was due more or less to good cultivation and the allowance of space between the plants. When, however, the amateur exhibitors and the Sweet Pea specialists started producing the very long-stemmed flowers, limited quantities of which found their way into the markets, it naturally followed that certain keen market growers began to inquire into things.

The indoor grower of ordinary blooms who thought he was doing well if he made 6/- (\$1.50) to 8/- (\$2) a gross early in May, opened his eyes when double and treble these prices were obtained for blooms the like of which had only been seen at exhibitions.

During the past two or three years several growers have made an attempt to produce such blooms under glass, but generally speaking, no bona-fide cut flower grower has yet succeeded in equaling the specialists—like Damerum, Alsen, or Dobbie & Co. Not a few have been turning out some really fine sprays, but if prices soared above 12/- (\$3) it was safe to say that the flowers had come from a grower who was not entirely dependent upon the cut flower business.

So far as the writer is aware, the highest figure made for Sweet Peas in Covent Garden in the Spring of 1914 was 18/- (\$4.50) for 12 bunches, containing one gross of stems. These were indoor grown, their season lasting from the latter end of April to mid-June, when the outdoor crop came in and depressed prices.

The finest of the outdoor blooms came toward the latter end of June, and the prices ranged from 6/- (\$1.50)

to 10/- (\$2.50) per dozen bunches, according to the state of the market. The ordinary short or medium-stemmed samples at the same period never exceeded 4/- (\$2), generally 3/- (75c.) or less. Very few growers, however, were producing the giant samples, Lowe & Shawyer, and W. H. Page being, perhaps, the only bona-fide market growers who followed in the footsteps of the exhibiting specialists.

The first named concern is unquestionably the largest producer of the giant or exhibition sample of Sweet Pea in that country for market cut bloom. Lowe & Shawyer's first effort was made in 1913 when they grew 25,000 plants, but the next year the area was greatly extended, several acres being devoted to the crop. To the ordinary mind this may not appear a very great item, but when one realizes that each plant is set out a foot apart, and that most plants demand two 10-ft. bamboo stakes apiece, it will be seen that this up-to-date method of Sweet Pea culture entails a considerable outlay.

We shall briefly outline how the up-to-date grower handles his crop, which, of course, is grown out of doors. The system really originated with the amateur exhibitor. The seed is sown between mid-October and the first week in November, according to the district. In the North, sowing is usually delayed until February, when seed, of course, is raised in heat. The Autumn sowings are made in coldframes; those with plenty of accommodation sow in pots, others sow in fairly deep boxes. As soon as the seedlings appear, the lights are kept off as much as possible, and even during the severest weather nothing in the way of coddling is attempted, otherwise the plants become drawn. Ten degrees above zero is considered "severe weather."

If sown in pots six seeds are placed in a 5-in. pot and



TWO SPRAYS OF THE BEAUTIFUL NEW ROSY-SALMON SUMMER-FLOWERING SPENCER, MARGARET ATLEE. C. C. MORSE & CO. SAY OF IT:
"IT IS THE GRANDEST SWEET PEA WE HAVE EVER GROWN"

the plants are not disturbed until planting time. Even when in boxes some growers do not disturb them, but others will pot off in February, allowing one seedling to a $2\frac{1}{2}$ -in., or two to a $3\frac{1}{2}$ -in. pot.

In one or two places the growers prefer to plant in the open in November, but in most cases they over-Winter their plants in frames. When the plants have made four or five leaves, by which time they are 3 or 4 in. tall, the points are nipped out to induce the basal eyes to push forth. Small twigs are inserted in the pots to keep the plants erect, and about the last week in March and during the first fortnight in April they are set out in their flowering quarters.

Opinions differ regarding planting, some arguing that single plants in small pots grow away better than those that have to be shaken out of the soil, which is necessary when more than one plant is grown in a pot. The writer's experience is that single plants suffer no check, and thus they come into flower earlier. Plants that are shaken out are apt to stand still, especially if cold winds are prevalent; but on the other hand they have, perhaps, a longer period of blooming. It need hardly be stated that the plants are thoroughly hardened off before planting. February sowings naturally require careful hardening off, and as a general rule they are not ready for planting out so early as the Autumn sown. Weather conditions and disease allowing it, the Spring sowings will carry on the blooming period over a longer season, but personally, we, ourselves, have given up February sowings, as disease affects them so seriously.

The method of planting generally adopted is the double row system. The plants are set 12 in. apart and 15 in. between the rows. Five feet is the average between

each double row, some giving more space. Where the bamboo system is adopted it is usual to fix up all such supports before planting. The method of erection is illustrated on pages 62 and 63.

Immediately after planting the growths are supported either by twigs or ties, and right through the season this is closely attended to. The first pinching out of the tops induces side growths, and with the general run of varieties the two strongest shoots are retained, the others being removed. Weak growers are carried upon the single stem principle, while very vigorous varieties are allowed three or perhaps four stems, otherwise the flowers come very coarse. When in full growth the plants need daily attention, for they require tying to the bamboos at nearly every joint. Furthermore, all side growths must be snapped out as soon as they can be got at, but it is unwise to remove the topmost side growth, until the leading point is clearly seen, otherwise the plant may run off blind. Or caterpillars or other causes may destroy the point, and if the lateral immediately below is removed, the plant's existence is finished, unless by chance a dormant eye remains at the base. In addition to the removal of side shoots, all tendrils are nipped off as soon as they are clear from the leaves. On bamboo canes the tendrils serve no purpose, and they are apt to seize the flower stems and make them crooked.

The plants grown on this system do not open flower until they are at least 3 ft. high, more often 4 ft., and in normal weather a two-stemmed plant will average three to four fully developed spikes per week. In dull weather the average will be less, and in warmer weather the average is higher, but in the latter case the flowers are not so fully developed, while in hot spells the stems are much shorter.

As a matter of fact, four days at a temperature of 90 deg. ruins most of the outdoor Sweet Peas in the south of England, for the plants turn hard and short jointed.

Of course, much depends upon the preparation of the ground and feeding. Poor soil cannot possibly produce plants with vines an inch wide, and leaves four or more inches across. The general preparation of the soil takes place early in the year. Trenches about 3 ft. wide are made, the soil being broken up and heavily manured to the depth of 2 ft. or 3 ft. Dung in liberal quantities is worked in, whilst the top spit is supplied with bone meal or superphosphate of lime, and sulphate of potash a month or so before planting. Potash is essential, while abundance of lime must also be applied. Nitrogenous fertilizers must be sparingly used. Very high feeding is ruinous, and the grower can only find out what his ground will stand by experience. Phosphate of ammonia and phosphate of potash in minute quantities, a quarter ounce of each in 20 gallons of water, is a wonderful stimulant, but it is unwise to feed plants until they have settled down to bloom. There are many special Sweet Pea fertilizers on the market, but there is nothing better than soot and tankage. Mulching with manure or spent hops is a valuable help in hot weather, but the plants must never be allowed to get dry at any period. *Aphis*, too, must be kept down rigorously.

CHAPTER X

INSECT PESTS AND DISEASES.

The most annoying and persistent, as well as destructive pest of Sweet Peas is certainly aphid, or green fly. Red spider is also troublesome under certain conditions. The subjugation of these, however, is discussed on page 70, under fumigation and spraying. Snails, eelworm, striped Potato beetle, and climbing cutworms have also all to be reckoned with. The eelworm spreads what is called the root knot disease, which cripples the roots by drawing upon their sap and injuring their tissues, and swellings are also produced. The cutworms may be picked from the plants at night while they are feeding, or poisoned baits may be placed about. One of the best is a mash of bran arsenic. This can be made by mixing one part of white arsenic with one part of sugar, and adding sufficient water to form a mash. Place this about among the plants so that the cut worms may eat it. Dusting with soot and lime is advised against snails.

As to the fungous diseases, it is a somewhat general but erroneous belief that the Sweet Pea is usually free from them. Certainly, if the utmost care is taken in its cultivation, much can be avoided. Nevertheless, even with the closest attention a collapse may occur because of Anthracnose or Sclerotinia disease. These are undoubtedly to be carefully guarded against. Taubenhaus mentions having found Sclerotinia libertinia, which resembles in all appearances the damping-off fungus of Lettuce seedlings

and many other plants. The spores of the Sclerotinia, he thinks, must have been introduced to the greenhouse with the soil or with manure, and therefore the Sweet Pea crop ought not to follow a crop of Lettuces which suffered from this disease. The same fungus can also at any time and in certain climatic conditions attack Sweet Peas out of doors.



STERILIZED SOIL SICK SOIL
RESULT OF SCLEROTINIA DISEASE

"In regard to anthracnose, it was first described by Prof. Sheldon of the West Virginia Agricultural Experiment Station. It is apparently an old disease known under the name of 'wilt' or 'drop.' In some works it is spoken

of as 'bud drop,' and is attributed to heavily manuring, and also to wet seasons. A rich soil and wet climates cannot produce the drop. These are only factors which help



ANTHRACNOSE OF THE SWEET PEA

the disease in its destructive work. The cause of the anthracnose disease is a fungus (*Glomerella rufo-maculans*), which also is the cause of the bitter-rot of the Apple.

Cross inoculations have been carried on with these two organisms and their identity definitely established. This means that if your Sweet Peas grow near some Apple orchard, and if the latter suffers from the bitter-rot, it will be carried readily by the wind or some insect to the Sweet Peas and produce anthracnose. It is thus seen how serious a proposition this becomes when we consider the many hosts which can communicate this disease.

"The symptoms of the anthracnose of the Sweet Pea are diverse. Sometimes the disease is manifested in a wilting and dying of the tips. These diseased parts become whitish and brittle and soon break off. Sometimes the dying works downward, and this involves the entire branch. Oftentimes the leaves are attacked and they soon die. On the leaves the disease starts as a white spot, which enlarges and involves the entire area. On the blossoms the fungus either attacks the junction between the flower buds and the peduncle—in this case the bud drops off, leaving the peduncle intact—or it attacks both flower bud and peduncle, and this time both dry up but do not fall off. The seed pods are also attacked in all their stages of development; in this case the fungus works inward until it reaches the seeds. The fungus is capable of living over Winter on diseased parts of the plants, in the soil or on the seeds, as was definitely proved in our experiments."—(Taubenhaus.)

The third annoying trouble is what is called the Mosaic disease, which may be recognized by the yellow dotting or mottling of the leaf, presenting in some instances a beautiful mosaic structure. This disease makes its appearance after the seedlings are from three to four weeks old and in bad attacks it curls up the leaves and dwarfs the plants. Sometimes, by judicious management as to watering, temperature and feeding, the affected plants outgrow the

MOSAIC DISEASE OF THE SWEET PEA



A healthy leaf

disease entirely. At other times the growth continues slowly, the disease keeping pace. It is believed that this disease is contagious, and that the punctures made by *aphis* may be responsible for the spread of the mosaic disease.

Fourth may be mentioned the Streak disease which, however, has been much more heard of in England than in America. The symptoms and appearances are very similar to those of the anthracnose. Taubenhaus and James F. Manns have arrived at the conclusion that the origin of streak is bacterial, and the same bacteria can affect the common Clover of the fields. Plants may be perfectly healthy until they reach their flowering period at a height of 3 ft. or more. Suddenly brownish or reddish patches in streaks appear on the stems, not necessarily at the base, but even at lateral growths. The result is a crippling of the growth, a curling of the flower buds, and a peculiar contorted appearance in the flowers when they expand. In severe attacks the whole plant collapses and has to be removed. It has been observed that this disease comes into evidence after a sudden change downward in the temperature, or in watering with very cold water which is thought to chill the roots. Being of bacterial origin it is suggested that so far as possible the stems ought to be protected from spattering by mud.

Mildew is, of course, another common fungus pest, but is controllable by dusting the flowers with sulphur as previously mentioned.

The general treatment recommended for controlling the foregoing bacterial diseases is that of sterilizing the soil, a subject dealt with already on page 50. There is also the formalin process of killing germs as they lie in the soil. "This treatment consists first in spading the soil

and bringing it to a good tilth condition as to moisture content. Then the soil is treated with a solution of formalin made of two pints of a 40 per cent. formalin in 50 gallons of water, at the rate of one gallon of the preparation to each square foot of the surface. The application may be given with an ordinary watering can. After the heavy wetting down the soil should be left free for about two weeks, until all the formalin evaporates. This treatment will rid the soil of all fungous pests. But it will not be effective in controlling nematodes, hence the steamheating method is best for them.”—(Taubenhaus.)

Little advantage has been found to result from the use of potassium permanganate as a fungicide so far as our own experience goes, for we have seen rows of Peas treated with strong and weak solutions which were no better than part of the same row left untreated. Nevertheless, in the case of an attack of anthracnose, or streak, or the mosaic disease, one may be prompted to use a pale wine-colored solution.

Root rot, caused by the fungus *Thielavia basicola*, eats away the roots and may travel up the stem a little at the base. For a time this was believed to be the cause of streak. Chilling of the roots or overwatering will tend to induce an attack. Other root pests are the *Rhizoctonia* disease and the *Fusarium* wilt, each of which at times, and under certain conditions, cause the seedlings or young plants to droop or damp off.

Dropping of the buds results from supplying a too highly nitrogenous food ration, and also by sudden fluctuations, especially lowering, of the temperature. Taubenhaus says: “We have successfully controlled this trouble within one week by the application of phosphoric acid and sulphate of potash along the row.”

CHAPTER XI

OUTLINE OF THE HISTORY OF WINTER-FLOWERING SWEET PEAS

Nearly forty years ago a writer in "The Gardener," a British monthly publication edited by David Thomson, described his treatment of Sweet Peas in pots. (See issue for March, 1876, page 140). By sowing the varieties of his day in large pots in March, he had them in flower throughout a large part of the Summer and until late in October. "I had a dozen potfuls," he says, "coming into bloom about the end of October out of doors, but the situation being subject to inundations, they had the misfortune to be three days under water, and they never recovered from the effects of this. Under more favorable circumstances, and with the assistance of a little warmth, I feel certain they might have been in full blossom at Christmas." After this one would have expected to hear more of Sweet Peas for Winter blooming, but much water was to flow under the bridges before a race of early-flowering varieties had been produced and made it possible to have blooms all Winter.

The origin of the present strains dates from about 1892, and the man above all others who placed this type on a commercial basis and brought it to the notice of the trade at large was Anton C. Zvolanek. He is a native of Krucemburg, Bohemia, and has had a love of flowers from his youth up. In 1876 he went to Vienna as a florist, and in the Autumn of 1888 came to America. Later he

was given charge of the greenhouses of H. Bolte, Allentown, Pa.; and afterward those of Emil Leuly, Angelique street, West Hoboken, New Jersey. He had been working upon Sweet Peas during this period and previously. He had even tried to hybridize some species of Vetch with the Sweet Pea. In this connection he wrote to S. B. Dicks, of Cooper, Taber & Co., wholesale seedsmen, London, England, in April, 1907: "The Vetch I have used for hybridizing grows, and is being largely sown, in Bohemia, mostly for green fodder. There are two varieties, one blue, the other red." Mr. Dicks points out that Zvolanek does not say which of these he used, and adds: "The blue flowering Vetch is no doubt *Vicia villosa*, and the red is probably *Lathyrus tuberosus*, as this plant grows very freely over the whole of Bohemia. The flowers are very sweetly scented, and the tubers are edible." In August of the same year Zvolanek added the following information: "The Vetch has flowers similar in color to those of the Sweet Pea Captain of the Blues, but they are very small. On the Moravian boundary of Bohemia, in a very moist and cool locality, it begins to bloom early in June."

In 1892 Mr. Zvolanek discovered among his Sweet Peas an earlier flowering variety among some Lottie Eckford, which was two weeks ahead of the others and was of dwarfer habit. This sport or early form was separated and from the seeds sown the next year he got plants which he cross-bred with Blanche Ferry. Blanche Ferry is, and was, well known for its precocity. Thus two distinctly early blooming Sweet Peas were mated. The seedlings from them, by selection, gave the first distinctly recognized Winter-flowering variety of Sweet Pea, 19 years ago, and was named Zvolanek's Christmas. It was introduced in 1899. Here was encouragement to go ahead,

and the practical Zvolanek, who had the stock in his hands, did not allow the grass to grow under his feet. Within two years he had three houses filled with the new Winter-flowering Peas, and New York market began to be well supplied with the blooms.

Other crosses and selections were made, some of which were exhibited before the New York Florists' Club, and one, Florence E. Denzer, was registered with the Society of American Florists & Ornamental Horticulturists in December, 1900. Mr. Zvolanek said of it: "This excellent sport surpasses its mother, Zvolanek's Christmas, in the size of its flowers, as well as in the length of stem, producing over 20 per cent. of its blooms with four flowers, on very long stems."

Progress from now onward was steady, the Christmas variety being largely employed with others to get a wide range of colors. Selections were also made the whole time toward the improvement of the size and strength of the flowers. Mr. Zvolanek still continues his work, but is now in California.

HISTORY OF SWEET PEA BLANCHE FERRY

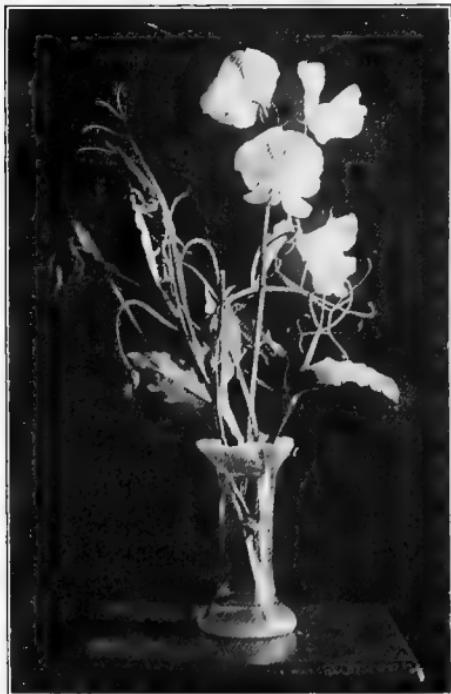
The history of Blanche Ferry, already mentioned, is interesting, and it has played a vitally important part in the development of the indoor type of Pea. It was the most grown variety in some of the markets. Until 1896 and later there was not sufficient of any other Winter Sweet Pea grown, at least in the Chicago region, to create a demand for them. The honor of having created this great American variety does not belong to any one whose name is blazoned on the horticultural scroll of fame, but to a humble woman, a quarryman's wife in Jefferson Co., New York, who was fond of flowers, and had a natural

tendency to cultivate and improve them. Some 55 years ago she procured seeds of a bright flowered plant of Painted Lady, and for many years thereafter she sowed and selected, and as her garden overlay limestone, and was of very shallow soil, averaging not more than a foot in depth, her strain of plants gradually became more compact. At the end of 25 years the type she had been selecting was of bushy form and was grown without support. W. W. Tracy, Sr., of the firm of D. M. Ferry & Co., Detroit, who is now superintendent of the Testing Gardens of the United States Dept. of Agriculture at Washington, D. C., saw the plants, and being immediately impressed with their distinctiveness and merits, obtained a small stock, only about 100 seeds. This was the famous Blanche Ferry, and was introduced in 1889 by the firm above mentioned. It was honored by having a colored plate in the firm's catalog that year.

Six years later Messrs. Ferry introduced the Extra Early Blanche Ferry, and described it in these words: "The Extra Early Blanche Ferry is more dwarf, very much earlier, and fully equal in all other respects to Blanche Ferry. How much earlier we hardly dare say, but the most competent observer who compared it with upward of 50 varieties, declares it is two or three weeks earlier than any of them. Our careful observation convinces us that it is so early and dwarf that in these respects it outclasses all other Sweet Peas, and while these qualities make it incomparably the best Sweet Pea for forcing, its dwarf habit and persistent blooming make it equally desirable for outdoor culture."

The House of Burpee distributed Earliest of All in 1898, when it was described in the catalog of the firm as "Not only the earliest to bloom in the open ground, but also the most desirable for forcing under glass for Winter

cut flowers. The dwarf habit of the plant (only 2 ft.) renders it much more easily grown upon benches, admits closer planting, and from seeds sown in the latter part of



A SPRAY OF THE NEW WAVED FORM OF TELEMLY SWEET PEAS
THIS VARIETY IS PINK

August blooms may be cut for the holidays, while with the taller varieties no blooms can be cut before February or March."

Four years later Burpee & Co. sent out a still earlier strain under the name of "Gould's Extreme Early Earliest of All." This Earliest of All strain originated with Thos. Gould in California.

"Mont Blanc was introduced by Ernest Benary, of Erfurt, Germany, in 1900. It is said that this variety came from Emily Henderson. Burpee, in his catalog for 1901, says that it is the exact counterpart of Earliest of All except in the color of the flowers, which are white.

"Earliest Sunbeams appeared in 1904 and was described as a primrose Mont Blanc, with which it was identical except in color.

"In 1904 Thos. Gould, of California, the originator of the strains of Earliest of All, found a white sport in a stock of the Reselected Earliest of All, which was identical with Earliest of All in every respect except color. Unlike Mont Blanc, it has a black seed. This variety, Earliest White, was introduced in 1906 by Burpee, who strongly recommended it for forcing.

"Thus we had, in 1906, a group of early-flowering varieties represented by Blanche Ferry, Extra Early Blanche Ferry, Earliest of All, Extreme Early Earliest of All, Mont Blanc, Earliest Sunbeams, and Earliest White, which were of distinct habit from the usual garden types and which were sometimes forced under glass. These varieties were all descendants of Blanche Ferry, from which they originated as seed sports either directly or indirectly. A further significant fact is that Blanche Ferry is a descendant of Painted Lady, which is the common name of the Sweet Pea described by Burmann in 1737 as a new species from Ceylon."—(Bulletin 319, Cornell University, Sept., 1912, Sweet Pea Studies, by Prof. A. C. Beal.)

From these facts, therefore, it is apparent that although

Zvolanek's name is most intimately associated with the indoor or Winter type, several other firms have been largely instrumental in the development of early bloomers.

Curiously, two Winter strains came to light almost during this exact same period, to wit, Carl Engelmann's, at Saffron Walden, England; and Rev. Edwyn Arkwright's, in his garden at Telemlly on the Mustapha Hill, near the city of Algiers, Algeria, Africa. The beginnings of each of these were recorded in the Sweet Pea Annual of the National Sweet Pea Society of England in 1907.

THE TELEMLY SWEET PEAS

"It was about the year 1900," said Mr. Arkwright, "that a sport from Blanche Ferry showed itself in my garden as early as February, and was promptly isolated from all others. The next year I had some plants flowering in January, and among them one red one, a cross apparently from Mars, on which a blossom or two had come out in May of the previous year. From these parents I have now ten or twelve of the usual colors, ranging from white to purple, and including duplicates, or shall I say imitations, of Honorable Mrs. E. Kenyon, Jeannie Gordon, Lady Grizel Hamilton, Mars, Black Knight, etc., which begin to flower about Christmas time and last for five months. That they form a distinct group is evident from the fact that Eckford's Sweet Peas, which I sow at the same time, i. e., at the end of September, do not flower till May. Moreover, the leaf is considerably narrower than in Eckford's varieties and more pointed and the stem appears to have more woody fiber."

Mr. Arkwright, writing to the author in August, 1914, says he still continues to grow his special varieties and has now almost every possible shade of color. He finds that



REV. EDWYN ARKWRIGHT AND HIS TELEMLY SWEET PEAS

the waved varieties are much the more popular. These he has had for the past several years and "there is no limit to their sporting powers," but as his object is to sell them for the benefit of the English hospital in Algiers, he says he is obliged to limit the number of definite colors to about twenty, so that the work may not get beyond him. He has also sold seeds to so many nursery gardeners that he does not expect the Telemlly Sweet Peas to remain much longer in his hands.

The greatest success recently scored by the varieties of this strain has been in Australia, where letters inform Mr. Arkwright that they have revolutionized the Sweet Pea cult. At the Queensland Horticultural Society's show a gentleman of Brisbane, who had bought Telemlly Peas the year before, came out first in each of six classes and "swept the board." Mr. Arkwright has had many enthusiastic letters and orders for his seed in consequence.

A photograph of the originator of this strain, together with a separate photograph of a spray of one of the finest blooms of his waved kinds, appears in connection with these notes. These Peas were awarded the gold medal of the Horticultural Society of Algiers in 1907, while a similar gold medal was awarded for a collection of the large new waved varieties in 1911. There are no names applied to the varieties other than those of their color, such as Apple-Blossom, Rose, Ruby, Lavender, and so on.

Mr. Arkwright advises that in Algeria, the Riviera, and similar climates the seed be sown in August or September, and that the plants be treated similarly to the Winter flowering strains known in this country. It should be remembered that the Telemlly type of early flowering Pea starts from one single stem, which needs sports when three or four inches high.



SWEET PEA GLADYS UNWIN, OF A TYPE VERY SIMILAR TO
THAT OF COUNTESS SPENCER. THE LATTER APPEARED
IN 1901 AND GLADYS UNWIN IN 1904

ENGELMANN'S STRAIN

In regard to Engelmann's strain he recorded in the same year (1907) and volume as follows: "It is nearly four years since some plants of Captain of the Blues sported with me and I have Winter-flowering varieties of quite distinct habit. Ordinarily, stocks sown in Autumn will not bloom under glass until the following April, but the newcomers commence to bloom from six to ten weeks after seed sowing, and continue to form branches and produce flowers all through the Winter. I have now Winter-flowering representatives of such varieties as Dorothy Eckford, Lady Grizel Hamilton and Miss Willmott, as well as a number of crosses between these, and the ordinary type and Mont Blanc, so that almost all Sweet Pea colors are represented. In 1906 I sowed my Winter-flowering varieties at the end of August and beginning of September, and the resulting plants commenced to flower in October and were splendidly in bloom at the end of November and early in December, and they should continue to flower until the ordinary Sweet Peas come into flower."

Engelmann ceased to grow his strain for the London market as he found there was insufficient sun during the Winter in England to enable him to produce good marketable flowers from November–March, and he can get the ordinary type of Spencer varieties in bloom from April, so that there is no great advantage in growing the Winter-flowering sorts. However, he is again beginning to work up a stock in his new Riviera branch, as there the plants flower well in the open, as well as under glass, and will no doubt have a great future in that part of France.

THE NEWER VARIETIES

Coming right abreast of the present day, we find that

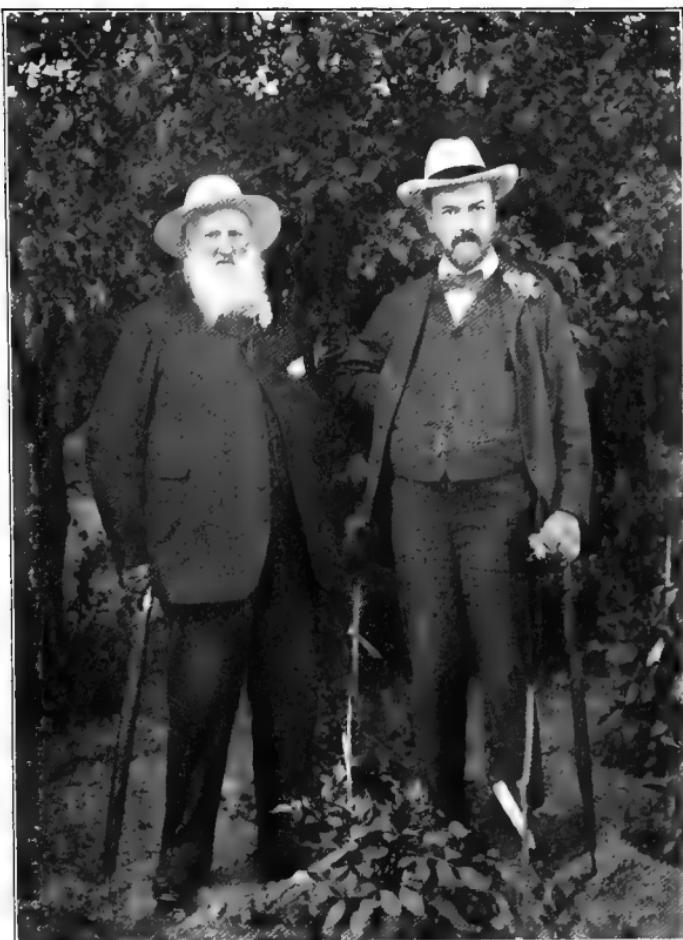
new Sweet Peas are beginning to be advertised almost like the novelties in Carnations or Snapdragons. Pittet's Rose Queen, for instance, has given a good account of itself. It has been most successfully grown in Indianapolis, Ind., since 1910, but A. G. Pittet, in whose greenhouse it originated, did not consent to its distribution until the season of 1914. Indianapolis florists recommend it as an earlier and more profuse bloomer than any variety in existence. Flowers from these plants have been picked from November 1 to June 15, and from the same bed. The color is a pleasing pink, making it outsell any other Sweet Pea line in that city. It is of the waved or Spencer type, with flowers $2\frac{1}{4}$ to $2\frac{1}{2}$ inches in diameter, borne on long stems, produced with the greatest freedom. They are of rich dark pink color.

Yet another outstanding variety is Anita Wehrman, which is becoming a favorite of the Chicago market. Henry Wehrman of Maywood, Ill., was the fortunate grower in whose hands this fine clear lavender Spencer Pea originated in the year 1909, and like a wise man he has grown it since, and through A. Henderson & Co., the Chicago seed merchants, he offered seeds for sale in 1914. There are three of four flowers on the 20-in. stems, and it is said of it that it retains its length of stem longer than is usual with other Winter-flowering varieties.

The merits of the Winter Peas speedily reached the ears of the hundreds or thousands of ardent growers on the other side of the world, namely in New Zealand and Australia. Sweet Peas were among the most difficult plants to cultivate successfully in the warmer regions of these countries, because the older varieties bloom in the late Spring when the country is liable to heat waves, accompanied by drying winds; these shortened the flowering

season to a few weeks only. The introduction of earlier-flowering varieties represented by Earliest of All Blanche Ferry, the Telemly, and similar strains were therefore received with great favor and as a distinct acquisition. In an article written by Arthur Yates, the Sydney seedsman, he observes that these varieties flower in Winter or Spring in the warmer districts and yield a supply of blooms for several months, at a time when there is very little else available.

Some of the enthusiasts took to selecting, and succeeded first in getting forms of the grandifloras. It happened as in so many previous instances that in the year 1909 a sport appeared, the novelty being in a batch of Spencers in the garden of James Young, Sydney, and its characteristics were larger blooms and an upright growth; this was in full bloom when the others were only a few inches high, and it had gone to seed before the normal type had commenced to show flower buds. "The seeds of this plant were saved and sown the following Autumn, when it came quite true to the parent, and instead of remaining more or less dormant all the Winter, as the ordinary Spencers do, it commenced to bloom in the late Autumn and continued to flower right through the Winter, going to seed in the early Spring as the Telemly and American Winter-flowering varieties do in Sydney, the Winters here being comparatively mild, with only light frosts." A point to which special emphasis is directed is the vigor and strength of this variety, which has been named Yarrawa. The flowers possess a bright rose standard with lighter wings on a carmine ground, and it at once occupied the place in Australia that Countess Spencer had on its first appearance in England. It is the first of a race of Winter-flowering Spencers which will be as popular in Australia



THE LATE HENRY ECKFORD, WHO WAS CALLED THE
"SWEET PEA KING"; HE BROUGHT THE GRANDIFLORA
TYPE TO PERFECTION. ON THE RIGHT HAND IS W.
ATLEE BURPEE, OF PHILADELPHIA, WELL KNOWN AS AN
INTRODUCER OF NEW SWEET PEAS

and as easily grown as the ordinary Sweet Peas are in England. It is believed that for warmer countries the Yarrawa strain will absolutely supersede all others. They bloom in two or three months from sowing and by planting them in succession a supply of blooms can be had during the greater portion of the year.

THE LATE HENRY ECKFORD

The work of Henry Eckford in England in crossing Sweet Peas began in 1870 or a little later, and can never be overlooked in any account of the history of this beautiful flower. Eckford worked steadily upon his crosses and selections until he had one that he thought good enough to introduce to commerce. This he named Bronze Prince, and it was first offered in 1882. Thereafter, from year to year his introductions were looked for, and so successful was he that latterly he was called the "Sweet Pea King." He entered into business for himself at Wem, Shropshire, where his son still conducts a seed trade. Among the best known of Eckford's earlier varieties were Captain of the Blues, Prince of Wales, Apple Blossom, Mrs. Sankey, Lottie Eckford, Dorothy Tennant, Blanche Burpee, Prima Donna, Black Knight and Lady Grizel Hamilton. It can be said that Henry Eckford was instrumental in perfecting the grandiflora type, which probably reached its highest perfection in the beautiful white variety Dorothy Eckford. In his namesake he also gave us the first of the orange-colored Sweet Peas. Moreover, it was said to have been a sport from Lottie Eckford that gave Zvolanek a plant to cross with Blanche Ferry, out of which came Christmas Pink. He was honored by the Royal Horticultural Society of England, which awarded him the coveted Victoria Medal of Honor. He died in December, 1905.

INDEX

(*For General Contents and List of Illustrations see pages 7 and 8*)

	Page
Acknowledgments.....	6
Algeria, Sweet Peas in.....	136
Anthracnose disease.....	122
Aphine, spraying with.....	70
Arkwright, Rev. Edwyn and his Télemly Sweet Peas.....	134
Australia, Sweet Peas in.....	136, 139, 140
Baltimore market, average wholesale prices.....	21
Bamboo stakes.....	119
Benches:	
Crop for.....	76
Yield from.....	32
Blanche Ferry Sweet Pea, history of.....	130
Boston market, average wholesale prices.....	20, 21
Branching of the Summer and Winter-flowering types.....	73
Buds dropping.....	127
Buffalo market, average wholesale prices.....	21
Bulb stock as a side crop.....	77
Canada, Sweet Peas in.....	92
Candytuft as a side crop.....	77
Chicago market and prices.....	12, 21
Chicago region, Sweet Peas in the.....	78-82
Cincinnati market, average wholesale prices.....	21
Clarkia as a side crop.....	76
Cost of production and profits.....	24, 32
Cow manure.....	74
Crops to grow with Sweet Peas.....	77
Cross-breeding Sweet Peas.....	105-108
Cultivation of Sweet Peas:	
Feeding.....	74, 120
Fumigating.....	70
Hoeing.....	76
Mulching.....	113
Pinching lateral growths.....	72, 119

	Page
Cultivation of Sweet Peas—Continued	
Planting.....	61
Screens and shading.....	113
Seed, the	53
Soil preparation.....	47
Sterilization.....	50
Sowing.....	54
Time of.....	55
In benches.....	59
In pots.....	58
Outdoors in Autumn.....	109
Spraying.....	70
Staking.....	61
Temperatures.....	67
Ventilating.....	69
Watering.....	66
Cultivation in the open air.....	109
Cultivation under glass.....	47
Cuttings, Sweet Peas from.....	60
Cutworms, remedy for	121
Dedication.....	5
Depreciation charges on establishment.....	32
Detroit market, average wholesale prices.....	21
Diseases and insect pests.....	121
Diseases, controlling.....	50, 126
Draughts, fatal.....	69
Earliest of All Sweet Pea, Burpee's.....	131
Easter, Sweet Peas at.....	14
Eckford, Henry, the late, his work.....	142
Engelmann's strain of Sweet Peas.....	138
England, up-to-date cultivation for market in.....	115
Exhibits of Sweet Peas at flower shows.....	13, 22
Feeding.....	74, 120
Fertilizers:	
Cost of.....	32
Kinds of.....	72, 76, 120
Flowers:	
Actual yield from two houses.....	31
Average yield per plant.....	26, 27
Packing the.....	99
Shading the.....	113
Formalin as a disease preventive.....	126
Fuel, cost of.....	32
Fumigating.....	70
Future, What has it in store?.....	11
Grandiflora and Spencer types.....	88

Heating.....	44
Piping required for house 130ft.x30ft.....	46
History of early-flowering or Winter Sweet Peas.....	128-142
Hoeing and cultivating the soil.....	76
House for Sweet Peas, style of and construction.....	36
Indiana, Sweet Peas in.....	82-84
Insect pests and diseases.....	121
Interest on investment.....	32
Introduction.....	9
Kainit.....	75
Labor, estimated cost of.....	32
Lateral growths in Sweet Peas, pinching.....	119
Lupines as a side crop.....	77
Manures and fertilizers.....	72, 74, 120
Market conditions and average prices.....	12
Market cultivation in England.....	115
Marketing and packing.....	99-104
Mignonette as a side crop.....	76
Mildew on Sweet Peas.....	70, 126
Milwaukee market, average wholesale prices.....	23
Mosaic disease of Sweet Peas.....	124
Mulching.....	113
Myosotis (Forget-me-not) as a side crop.....	77
New York and Eastern States, Sweet Peas in.....	87-89
New York market, average wholesale prices.....	17, 23
Nico-Fume, fumigating with.....	70
Number of sprays from a plant.....	26
Office tally.....	104
Packing and marketing.....	99-104
Pansies as a side crop.....	77
Pennsylvania, Sweet Peas in.....	85-87
Permanganate of potash.....	127
Philadelphia market, average wholesale prices.....	16, 23
Section, Sweet Peas in.....	84
Phosphatic manures.....	74
Picking and packing for market.....	99
Pinching tops and side shoots.....	119
Pittsburgh market, average wholesale prices.....	23
Planting (see also Sowing)	61
Distances apart.....	30
On the double row system.....	118
Position for Sweet Peas.....	47

	Page
Potash.....	74
Price of seeds.....	27
Prices, average, in the wholesale markets.....	9-12
Tables.....	22-23
Production, cost of, and profits.....	24
Profits and cost of production.....	24
Quicklime.....	75
Raising new varieties.....	105
Regulating the shoots.....	72
Retail florists as growers.....	34
Root rot of Sweet Peas.....	127
St. Louis market, average wholesale prices.....	23
Sclerotinia disease of Sweet Peas.....	121
Screens.....	47
Seeds:	
Amount required for given space.....	28
Cost of.....	32
Germination of.....	53, 57
Growing plants under glass for.....	27
Number per ounce.....	54
Prices of.....	27
Time for sowing.....	55
Yield from.....	28
Shading the flowers.....	113
Sheep manure.....	74
Shoots, regulating the.....	72, 119
Single stem system of growing Sweet Peas.....	42, 69, 71
Snails, preventive of.....	121
Soil:	
Disinfecting.....	52
Preparation.....	47-49
Reclaimed.....	75
Sterilization.....	50
Soot as fertilizer.....	74
Sowing in Autumn:	
Outdoors.....	109
Indoors.....	54
In benches indoors.....	59
In pots.....	58, 116
Time of.....	55
Spikes per plant per week.....	119
Sprayers, auto air pressure.....	70
Spraying.....	70
Stakes, cost of.....	32

INDEX

147

Page

61

Staking and supports.....	50
Sterilization, soil.....	126
Streak disease of Sweet Peas.....	70
Sulphur as a preventive of mildew.....	25-47
Sweet Peas from cuttings, 60; in pots in 1876, 128; in the open air, 65, 114, 135; packed for market, 101; single stem system of culture, 42, 69, 71; under glass.....	134
Télemly Sweet Peas.....	67
Temperature for Sweet Peas indoors.....	68
Temperature, night record.....	90
Tennessee, Sweet Peas in.....	92
Texas, Sweet Peas in.....	77
Tomatoes to follow Sweet Peas.....	120
Trenching.....	139
Varieties:	
Anita Werhman.....	133
Blanche Ferry.....	133
Christmas Pink.....	35, 95
Earliest of All.....	133
Frilled Pink.....	15, 25
Gladys Unwin.....	137
Inspector.....	30
King White.....	65, 85
Maggie Stark, Double.....	91
Margaret Atlee.....	117
Mont Blanc.....	133
Mrs. Alex. Wallace.....	79
Mrs. Wm. Sim.....	56
Painted Lady.....	133
Rose Queen.....	33, 83, 139
Télemly.....	132, 135
Yarrawa.....	51
Varieties for exhibition in Summer, 98; for sowing in Winter, 96; selections.....	95
Ventilating.....	69
Violets to grow with Sweet Peas.....	77
Water cisterns and watering.....	66
Weeding and hoeing.....	76
Wallflower as a side crop.....	77
Winter Sweet Peas out-of-doors.....	109
Zvolanek, Anton C., his work.....	128

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